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ABSTRACT

The Formative Evaluation and Heuristic Research (FEHR) PRACTICUM, a computerized game, gives practical experience in such program evaluation tasks as problem definition, operationalizing objectives, field study, budgeting, proposal writing, data analysis, and interpretation--without the expense and time commitments required by most research. The players, graduate students or practicing professionals, design and conduct an experiment comparing the effectiveness of available educational programs on students in a mythical school district. As a "research assistant," the computer can identify individuals or groups of students by category (test score, grade, sex), apply educational programs, and administer and score tests, which determine the effects of a program over time. There is no predetermined decision; rather, the results of each team are critically evaluated and methodological implications are discussed. The Game Manager's Manual is a comprehensive guide to FEHR. The introduction describes experiences which FEHR can provide, and the author's perspective on the program evaluation process. Three detailed descriptions are presented: (1) Players' Introduction--an overview of the game, its physical components, and descriptions of the problems available, (2) Fair City U.S.A.--a chamber of commerce description of the mythical community, and (3) players' step-by-step instructions for completing tasks assigned by the Game Manager. General guidelines for setting up and validating the computer program, training instructional staff, and adapting FEHR to local needs and purposes are included. (CP)

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FEHR PRACTICUM

Game Managers Manual

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FEHR-PRACTICUM GAME MANAGER'S MANUAL

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TABLE OF CONTENTS

Section I

Introduction.....7

Purpose.....7
Organization.....7
Need.....8
Instructional Role.....9
Practicum Environment.....10
Populations Served.....11
Experiences Provided by the Game.....11

Section II

Chapter I

Players' Introduction.....17
Addendum
Description of Materials.....29
Overview of Available Problems.....33

Chapter II

Game Manager's Manual.....42
Fair City, U.S.A.....46
Appendix - Fair City

Table 1 - Fair City, U.S.A., 1970 Census, by Census Tracts.....63
Table 2 - 1970 Population by Age.....63
Table 3 - Location of Schools by Census Tracts.....64
Table 4 - Public School Enrollment by Schools, Last Year.....65
Table 5 - Public School Enrollment by Level and Race, Last Year.....66
Table 6 - Percent of School Age Population Enrolled in Public Schools: Last Year.....66
Table 7 - Enrollments by Senior High School Districts: Last Year.....66
Table 8 - Student-Teacher Ratio.....66
Table 9 - Statistics on Classroom Teachers.....67
Table 10 - School System Staff.....67
Table 11 - Population Distribution by Race: 1950-1970.....68
Table 12 - Economic Characteristics of the Population: 1970.....68
Table 13 - Population Mobility: 1960 to 1970.....68

Chapter III

Players' Instructions....70

Preface....71
Instructions....74

Task 1: Orientation Questionnaire....76
Task 2: Organization and Assignments....75
Task 3: Operationalizing the Problem....78
Task 4: Determining the Extent and Severity of the Problem....82
Task 5: Identifying a Pool of Research Subjects for Treatments....86
Task 6: Empirical Evaluation of the Educational Treatment(s)....86
Task 7: Attend the Consolidation Session....90

Appendix I

FEHR Resources....92

Appendix II

Auxiliary References....96

Appendix III

Instructions for Obtaining Information from the FEHR Data Generator....100
Instructions for Preparing Cards for the FEHR Data Generator....102

Section III

Implementing the Standard Remar Problem....111

1. Defining Session Goals....113
2. Choosing Personnel for the Session....113
3. Familiarizing Personnel with the Data Generator....114
4. Familiarizing Personnel with the Practicum Process....146
5. Choosing a Place to Meet....146
6. Selecting Materials for the Session....147
7. Choosing the Practicum Tasks....148
8. Planning the Instructional Activities....148
9. Evaluating the Practicum Products....159
10. Evaluating the Effectiveness of the Practicum....159

Example 1.

The In-Service Workshop.....160

Example 2.

The Research Training Module.....163

Example 3.

Applied Statistics Laboratory.....179

SECTION I:

INTRODUCTION

FEHR-PRACTICUM is a computerized simulation which provides practical experience in decision-oriented educational research and evaluation. It is intended as a pedagogical tool to facilitate instruction in such program-evaluation tasks as defining the problem, operationalizing objectives, designing a valid field study, budgeting, writing proposals, analyzing data, and interpreting outcomes with respect to an impending decision. The acronym FEHR (pronounced "fair") stands for Formative Evaluation and Heuristic Research. Formative evaluation refers to an assessment during the development of a program which performs the functions of feedback, diagnosis, and guidance. Heuristic research is meant to suggest a decision-oriented process that seeks practical solutions to educational problems. The name FEHR-PRACTICUM was intended to emphasize our focus on a practical problem-solving experience which features the use of research/evaluation technology in making decisions about educational programs.

Purpose

This manual is intended as a comprehensive guide for the implementation and use of the FEHR-PRACTICUM system. In addition to a comprehensive description, it provides detailed instructions for planning and administering a practicum session. To facilitate instructional planning, a discussion of the conceptual foundations of the FEHR approach is provided, together with a brief list of instructional guidelines for each choice point in the flexible FEHR format. A variety of practical examples are given to illustrate the purposes which can be served.

Organization

In general, this manual is organized sequentially on a need-to-know basis. The broad outlines of the model are presented first, followed by a detailed description of each task as it arises. A complete front to back reading of the manual is recommended prior to the first practicum session.

The manual contains four major sections. A brief description of the general nature and purpose of the materials in each section is provided below.

Section I. Introduction.

The remainder of this introductory section provides an overview of the entire FEHR-PRACTICUM system. Its purpose is to acquaint potential users with the author's perspective on the program evaluation process and to describe the part which FEHR-PRACTICUM might play in research/evaluation training -- both pre-service and in-service.

Section II. Detailed Description.

The second section contains a detailed description of FEHR-PRACTICUM, summary description of the eight problems available in the system,* a list of the tasks involved in a typical practicum, and step-by-step instructions for completing each task.

Section III. Planning and Managing a Session.

The third section provides detailed instructions for planning and managing the first FEHR-PRACTICUM session at a new location. The first half of the section contains general guidelines for setting up and validating the computer program, familiarizing instructional staff with the system, and adapting FEHR to the local needs and purposes. Practical examples of various uses of FEHR-PRACTICUM are provided following the general guidelines. In the interests of clarity, all examples and illustrations in this section are based on a standard problem in remedial arithmetic.

* Problem 5 has been deleted from these materials because of intractable problems in simulating data at discrete time periods.

Need

In late 1969, education entered an era in which its sources of revenue began to dry up while its costs contined to climb at an accelerating rate. The combination produced an inexorable demand for educators to provide evidence that their programs were, in fact, producing the results for which they were intended. Simultaneously, educators themselves, faced with austerity budgets, began to clamor for information which would help them decide which programs were most effective and efficient and, alternatively, which could be most easily sacrificed. Many were surprised to discover that personnel who could supply relevant, convincing information were largely unavailable -- despite the intensive national research training effort of the sixties.

The reasons for this apparent failure are discussed in a comprehensive report by the Phi Delta Kappa National Study Committee on Evaluation (Stufflebeam, et al., 1971, pp. 302-307). Collecting valid information for this kind of educational accountability, they say, requires personnel who are skilled in adapting and integrating the ideas and methods of classical educational/psychological research, economics, political science, administration, decision theory, and general systems theory to meet the specific needs of an impending educational decision. Persons with these skills are hard to find -- even among the graduates of doctoral programs in educational research/evaluation at our most prestigious institutions. Although they identify certain concepts and techniques which need further development, the PDK Committee points out (pp. 307-308) that most major universities currently offer courses which could develop most of the required conceptual skills. What is missing, they say is a carefully-planned sequence of apprenticeship or practicum experiences which can be completely integrated with the instructional activities of the regular curriculum.

Instructional Role

The traditional apprenticeship or practicum experience is unsuited to the training task described above for two reasons: (1) it is usually too far removed from the classroom in both time and distance to permit either direct application of the principles studied or planned reinforcement activities, and (2) the sequence of activities dictated by the needs of the project seldom coincide with the instructional objectives of the training program. How-

ever, FEHR-PRACTICUM permits students or practicing professionals who wish to upgrade their skills to get practical experience in a variety of realistic, decision-oriented field studies ranging from the validation of a questionnaire for student evaluation of teaching at the college level to the assessment of an elementary reading program or the evaluation of a Headstart project. Each of the above examples is based on a FEHR-PRACTICUM problem. There are eight major problems available, each set in a different content area and involves subjects at a different educational level.

It is important to understand at the outset that FEHR-PRACTICUM is not intended to provide instruction in research/evaluation techniques. Rather, it provides an opportunity to apply theoretical principles to practical educational problems, to practice and develop research/evaluation skills in a complex environment which requires constant extension, generalization, and adaptation of those principles. Pedagogically, FEHR-PRACTICUM is a manageable field experience which is always accessible. It provides a safe vehicle for practicing complicated research strategies, and it provides immediate feedback on the effects of long-term treatments. When carefully articulated with an appropriate training program, the practicum can provide a thread of continuity about which disparate ideas coalesce, thus promoting integration and synthesis.

However, FEHR-PRACTICUM, like other field experiences is not particularly fruitful in isolation. If the practicum is not accompanied by planned instruction, it is imperative that the player-trainees have access to expert consultants and/or ample reference materials designed for independent use. A discussion of the instructional implications of integrating FEHR-PRACTICUM into an existing training program is provided in a subsequent section.

Practicum Environment

An important advantage of a FEHR-PRACTICUM is that it allows participants to try out new approaches to planning, budgeting, and evaluation without subjecting real student-subjects to the uncertainties of experimental conditions. Instead, the subjects for FEHR-PRACTICUM experiments are drawn from the simulated school system of Fair City, which is located in the mythical state of Utopia, U.S.A. The instructional effectiveness of the practicum is directly related to the quality and depth of this simulated environment.

Populations Served

The format of the FEHR-PRACTICUM problems was specifically designed for flexibility. Basically, this was accomplished by providing a checklist of optional assignments which allow the game manager to adjust both the scope of the practicum as a whole and the complexity of each of the tasks involved. Guidelines for choosing the options best suited to the instructional purposes of a particular practicum session are provided in Section III of this manual.

This extremely flexible structure of the FEHR problems makes it difficult to anticipate all the potential clientele. However, the authors have successfully used FEHR-PRACTICUM as the core experience in each of the following training activities:

1. A twelve-session Saturday morning extension course (workshop) designed to acquaint educational administrators (primarily principals) with the basic principles of empirical program evaluation. The courses emphasized problem conceptualization skills and the ability to communicate with statistical consultants.

2. A one-semester laboratory practicum designed to acquaint first-year graduate students in Special Education with the strengths and weaknesses of various standardized tests commonly used to diagnose learning disabilities, the principles of differential diagnosis, and the basic ideas of research design and statistical analysis.

3. A two-semester sequence of research design and data analysis courses required of all Ph.D. students in education. Most of these students had no previous research experience, and many had previously-established negative attitudes towards mathematics and were openly anxious at the prospect of learning statistics.

Experiences Provided by the Game

FEHR-PRACTICUM is intended to provide a wide range of practical experience in educational research and evaluation without the expenses and time commitments involved in real research. The practicum provides players with direct experience in gathering and analyzing empirical data in order to arrive at a practical educational decision, and provides feedback respecting the adequacy of their decisions.

Given the goal of simulating the entire research/evaluation experience, common sense would dictate that the closer the simulation is to reality, the more valuable will be its contribution to practice. Consequently, a con-

scious attempt is made to provide many of the complex interactions (and frustrations) which are characteristic of field research as opposed to laboratory research. A partial list of the experiences which can be provided appears below. However, the user has the option to emphasize one experience and de-emphasize (or omit) another. Instructors may choose the combination best suited to their needs. FEHR-PRACTICUM has the capacity to provide practical experience in each of the following areas:

1. Identifying and making explicit the basic or "real" problem. Conceptually, a "real" problem may be defined as the discrepency between what is happening and what should be happening. However, it is a common occurrence in real-life evaluation work to be presented with a "problem" which is, in fact, a request for an implementation decision about one of a series of alternate solutions. For example, "Should we implement program X?" is a solution masquerading as a problem. Identification of the basic problem facilitates the identification of relevant dependent (or criterion) variables. Note: This is perhaps the most difficult task (conceptually) in the entire practicum. Questions of relative value and whose value system must be dealt with.

2. Stating a problem in operational terms. The practicum provides considerable practice in this area since the computer requires all requests for information to be made in terms of the values of particular variables.

3. Preparing a budget and working within its constraints. In all except a few restricted versions of problems, the players are given a finite research grant and must pay for each bit of information they collect. In addition, players must pay themselves a daily salary. Thus, careful planning of expenditures of both time and money is necessary.

4. Developing and following a sampling plan. The average FEHR-PRACTICUM problem contains literally thousands of potential research subjects, each with a wide variety of individual characteristics (sex, intelligence, socio-economic status, etc.). Almost any sampling plan which can be used in real research can be duplicated in the game--including plans which are invalid because of some type of selection bias.

5. Selecting dependent and independent (moderator) variables which are relevant to a given problem and choosing the instruments (tests) which will be used to measure them. Although the players cannot devise their own tests, they may choose from a large pool of tests which are made available in the practicum. To help them in assessing

the utility of the various tests, players have access, via the Information Bank, to test descriptions of the sort provided by Buros (1965). Depending on the problem area, the game provides scores on from 50 to 160 separate tests. Each test may be used with any subject, and may be administered repeatedly across time.

6. Using survey techniques to identify the important dependent and independent variables in a given educational problem. In the practicum, surveys are frequently required to determine the extent and severity of a problem and/or to clarify the relationships among variables.

7. Designing research plans which isolate the effects of specific educational treatments and treatment combinations. The practicum allows players to collect data according to almost any research design which can be used in a real-life situation--including biased or invalid designs. The possible designs include both the univariate and multivariate forms of latin squares, incomplete blocks, longitudinal studies (panel data), and case studies based on variable scores (rather than verbal descriptions). Because of the capacity to produce longitudinal data, it is possible to simulate formative evaluation studies involving sequences of treatments and repeated observation periods.

8. Analyzing data collected from complex designs. The capacity to provide such analytic experience is ensured by the complex designs mentioned in (7) above. In addition, the game has a number of built-in biases which encourage players to use designs involving multiple criteria (dependent variables). Thus, multivariate analyses are usually appropriate. (Of course, the capacity actually to conduct such analyses depends on the resources of the local computer installation.)

9. Modifying research plans to accommodate unforeseen events in the environment. For example, a teacher strike could modify student attitudes as well as cause an expensive delay in a project. Such simulated events can be used with sophisticated trainees, but are not recommended for beginners.

10. Selecting consultants and preparing plans to optimize their effectiveness. The practicum provides an opportunity for players to explore their own limitations, and to find the conditions under which a consultant is "worth the money."

11. Relating the results of an evaluation to the time at which the evaluation is taken. The game permits program evaluations to be made at different points in time and to compare the results.

12. Working with educational problems in a variety of content areas and at numerous educational levels. The topics of the eight problems available run from the traditional subjects (e.g., mathematics and reading) to the specialized difficulties of handicapped children.

The educational levels represented include both pre-school children and college students.

13. Assessing the quality of research procedures (in the comparative phase) by examining the results obtained from "operating" a decision based on the research results. To aid in this task, the computer supplies two bits of information which are not obtainable in real-life research: the "decision effectiveness index" and a statistical summary of the characteristics of the students best suited to each treatment. These are not intended as absolute indices of quality, but rather as springboards for discussion.

PLAYERS' INTRODUCTION TO FEHR-PRACTICUM

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PLAYERS' INTRODUCTION TO THE FEHR-PRACTICUM GAME

Program research and evaluation have always been important activities in education, but they have recently become even more important because of a growing public emphasis on the twin themes of innovation and accountability. On the one hand, there is mounting pressure for bold new educational programs to meet the changing needs of an increasingly urbanized society, and on the other, an accelerating demand for educators to provide evidence that their programs are in fact producing the results for which they were intended.

You are about to play the FEHR-PRACTICUM game, which was designed to familiarize you with the problems and complexities of conducting program research and evaluation studies in educational systems, such as the public schools, and to provide an opportunity for you to practice your research/evaluation skills. The name FEHR was chosen because the game emphasizes formative evaluation and heuristic research; that is, evaluation conducted to provide feedback and guidance during program development, and research projects intended to provide information to facilitate specific decisions. Playing the game will give you direct laboratory experience with planning and budgeting a research/evaluation project and with analyzing and interpreting the results. However, FEHR-PRACTICUM projects are simulated rather than real research because they are conducted in a simulated educational system which exists in the mythical community of Fair City, U.S.A.

What Are the Advantages of Simulated Research?

If indeed, "experience is the best teacher" and "we learn by doing", it would seem that a sound educational course is to allow people to be directly involved in the situations in which they express interest. Thus, we would have aspiring plumbers plumb, surgeons operate, and educational researchers research. However, learning research and evaluation skills by doing real field studies presents some serious practical problems:

(1) Frequently, a trainee's initial efforts will be failures. In education, this might involve an unacceptable risk to the welfare of the students and, perhaps, the trainee's welfare as well. Often, even the accomplished researcher does not have the latitude to work out or develop high risk strategies to completion. Using a simulation, however, allows one to make mistakes in a safe environment.

(2) The time period to run an educational experiment, complete with data collection and analysis, is frequently a year or more. This large time lag makes the real world an inefficient environment for learning research principles. The most important advantage of simulation is its capability for rapid feedback. In a simulated school system, the results of an "experiment" are available in a few minutes.

(3) In field research, it is difficult to compare strategies empirically because even small changes in the research environment may spuriously affect the results. In a simulated environment, researchers can conduct either simultaneous or sequential experiments on the same population without confounding the experimental results. Thus, simulation enables us to assess the effectiveness of various research strategies by direct comparison of the results obtained.

(4) Funding for competent research/evaluators is difficult to obtain. It is likely to be impossible for the beginner. In a simulation, we can practice handling budgets without risking the loss of real money.

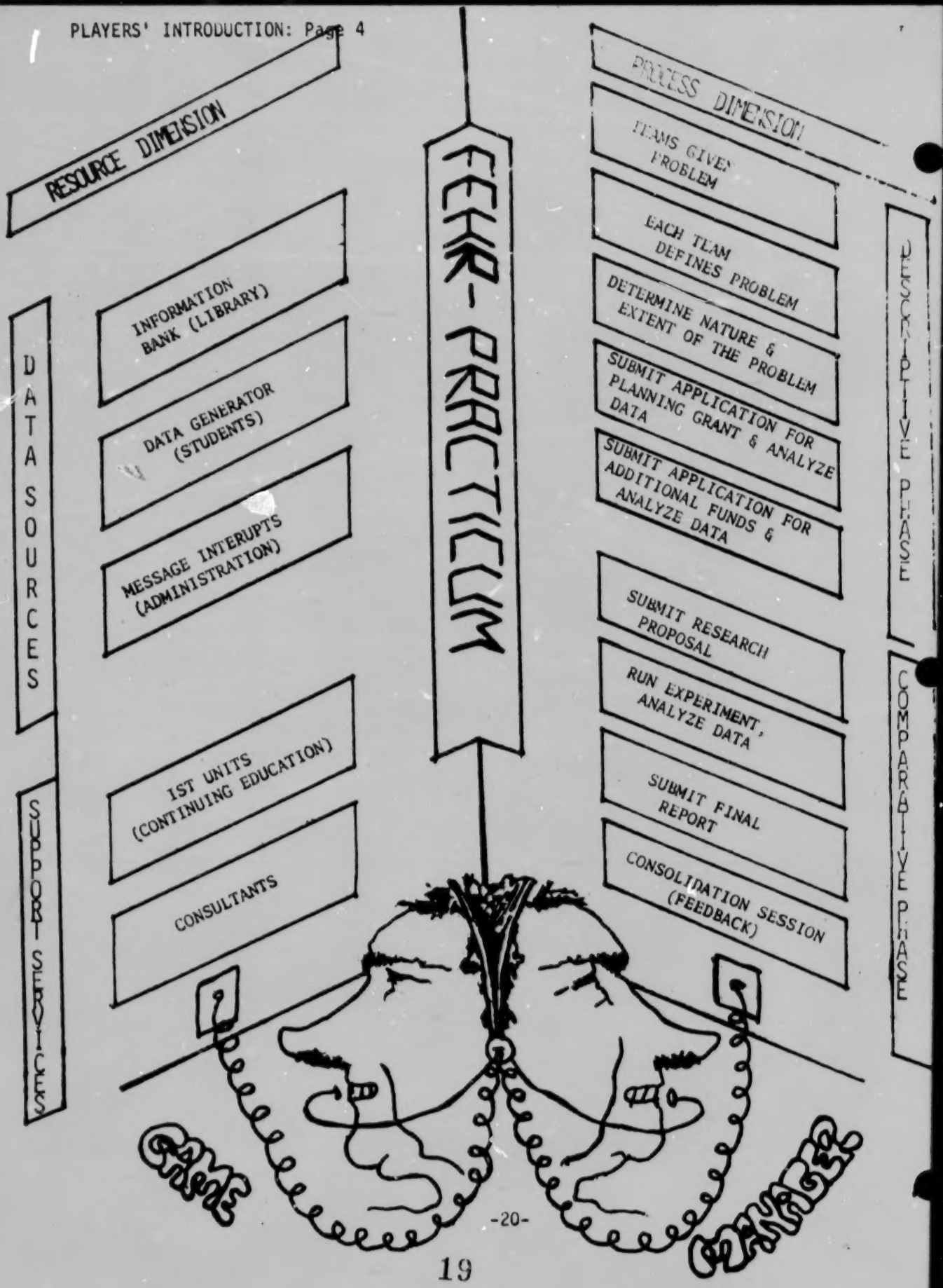
OVERVIEW OF THE GAME

In the FEHR-PRACTICUM game, you are a member of a team which has been hired to "solve" a research/evaluation problem which requires you to make a decision among several specified educational alternatives. The team collects information on which to base its decision by conducting a research project. However, in FEHR-PRACTICUM both the research environment (Fair City) and the behavior of the research subjects (i.e., the students and teachers) are simulated by a computer program. Therefore, your team cannot visit the research site in the usual manner. Instead, you must collect all your information via a special information line which connects you to the simulated school system.

FEHR-PRACTICUM is best viewed in two dimensions, the resource dimension and the process dimension, as illustrated in Figure 2. On the right the process by which a team "solves" an evaluation problem is defined. On the left are the physical components from which the players obtain the information required for their problem-solving activities. Typically, the solution process can be divided into two parts: the descriptive phase and the comparative phase.

In the descriptive phase, each team is concerned with obtaining an adequate definition of the problem--its nature, severity, and extent--and in determining what other people (i.e., past researchers) have done to remediate the problem. To accomplish this task, players must review the past research in the field (the Information Bank is a simulated library), relate the research findings to their knowledge of the community in which the problem is set (Fair City), and conduct surveys (via the Data Generator) using appropriate tests to determine how many students are affected and how severe the problem is.

During the comparative phase, each team is required to design and conduct an "experiment" to compare the effectiveness of the available treatments with


RESOURCE DIMENSION
PROCESS DIMENSION
FEKR-PRACTICUM
DESCRIPTIVE PHASE
COMPARATIVE PHASE
DATA SOURCES
SUPPORT SERVICES
INFORMATION BANK (LIBRARY)
DATA GENERATOR (STUDENTS)
MESSAGE INTERUPTS (ADMINISTRATION)
IST UNITS (CONTINUING EDUCATION)
CONSULTANTS
TEAMS GIVEN PROBLEM
EACH TEAM DEFINES PROBLEM
DETERMINE NATURE & EXTENT OF THE PROBLEM
SUBMIT APPLICATION FOR PLANNING GRANT & ANALYZE DATA
SUBMIT APPLICATION FOR ADDITIONAL FUNDS & ANALYZE DATA
SUBMIT RESEARCH PROPOSAL
RUN EXPERIMENT, ANALYZE DATA
SUBMIT FINAL REPORT
CONSOLIDATION SESSION (FEEDBACK)
GAME
GAME

students of various characteristics. The teams then analyze the results, and decide which treatment the schools should use with each type of student. Each team's decision is submitted to the game manager who "operates" the system with that decision in the computer simulator. The computer has the capacity to try one treatment with a student, then set him back where he started and try another treatment. It is therefore possible to compute each team's "decision effectiveness index," which is the ratio of the total growth (learning) obtained under the team's decision to the total growth possible if each student were assigned to the treatment which maximized his growth. In addition, the computer prints, for each available treatment, a set of summary statistics which describe the characteristics of the students whose growth was maximized by that treatment. At the end of the game, the game manager, consultant(s), and players meet together in a consolidation session at which the decision results of each team are critically evaluated and the methodological implications discussed.

Players can best comprehend the nature and scope of the research projects possible in the FEHR-PRACTICUM system by imagining that a real school system exists at the other end of the information line, and that the computer program is a "research assistant" who will do exactly what they ask--no more, no less. Although it is not able to converse with players, the program can perform the following tasks:

(1) Search the school files and return information such as the grade and past or present achievement scores for an individual student, or for all students in a particular school or class.

(2) Administer tests, attitude scales, or questionnaires to individuals or to a group of students and return the resulting scores. However, in any one FEHR-PRACTICUM problem, the only tests which can be administered are those listed in the variable catalog which is provided at the beginning of the game.

(3) Find and print out the names (ID numbers) of subjects who have patterns of variable scores of a pre-specified type. For example, it could print out the ID's of all students in grade 7 who are male and had IQ scores less than 100.

(4) Administer any specified treatment (educational program) to students identified by individual ID's or to groups of students identified by school, class or a pre-specified pattern of variable scores. Since tests can be administered at any time, they can be used to determine the effects of a treatment over time.

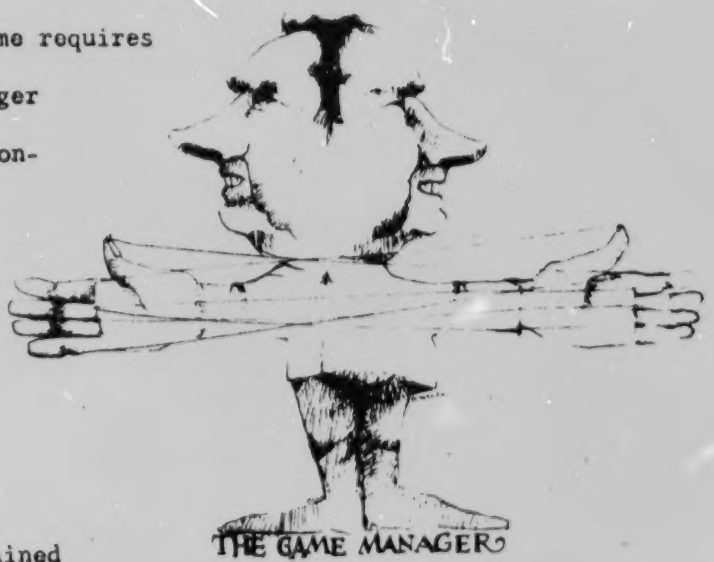
In FEHR-PRACTICUM research, as in real life, the type of research design chosen is frequently dependent on the amount of money available for research. At various points in the game, your team must apply for research grants. Throughout the game, each team member is paid a salary. Each test administered and each treatment applied also has a cost attached. These services are paid for out of a special FEHR-PRACTICUM checkbook, which is set up to help you keep track of the monies spent. (In locations which have a computerized FEHR bookkeeping program, the checkbook will not be used.) Thus, one of a team's major tasks is to plan its research so as to ensure that it obtains sufficient information to permit a valid decision without exceeding its grant funds.

FEHR-PRACTICUM is a game in that several teams normally attack the same problem and compete for the "best" solution. However, the competition is parallel rather than direct, since the actions a team takes cannot affect another team's solution in any way. It should be pointed out that there is no "right" experiment to perform and no predetermined "correct" decision. In addition, a team need not decide to use the same treatment for all subjects; it is entirely reasonable

to assess the relative merits of the teams' research procedures by comparing the sets of variable scores which are obtained after "operating" their decisions in the simulated system. This capacity for feedback on the quality of a researcher's work is considered the most valuable aspect of the FEHR-PRACTICUM model.

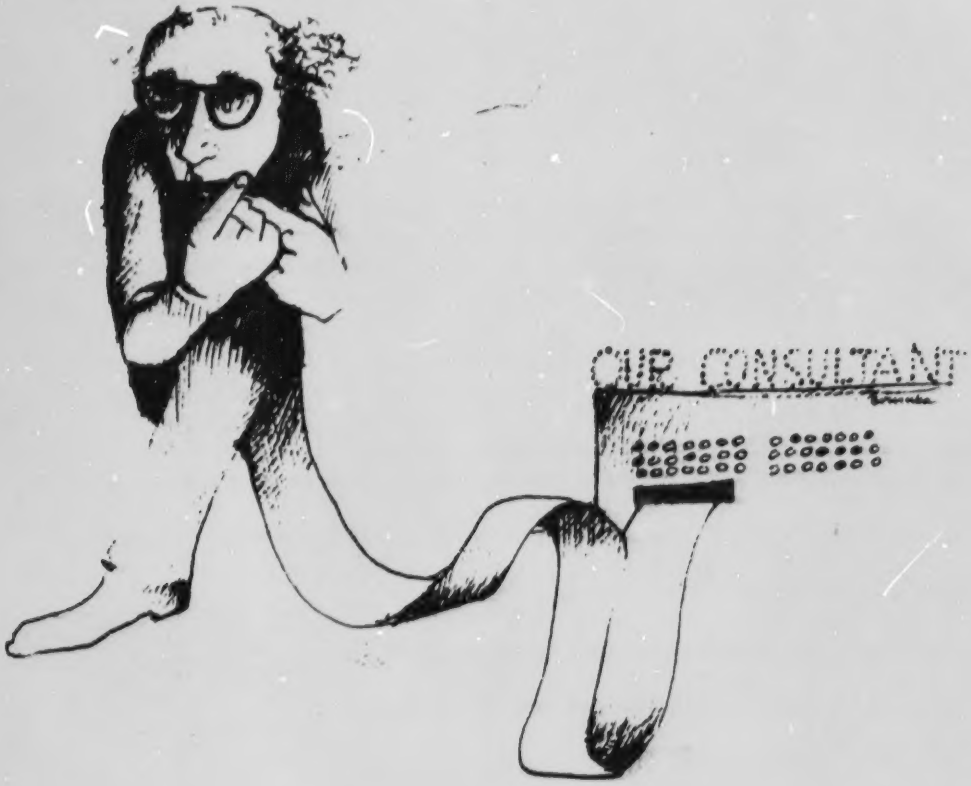
Operating Staff

The FEHR-PRACTICUM game requires the services of a game manager and at least one research consultant. The function of each of these staff members is explained below:


THE GAME MANAGER

The Game Manager is a senior research specialist who has been trained to supervise the game. His major task is to act as a liaison between the players (or teams) and the simulated school system. All requests for information and all replies to these requests must pass through his hands.

The research consultants in the FEHR-PRACTICUM game serve the same function that they would in real-life research. Whenever a player (team) is uncertain about any aspect of their research methodology, they may hire a consultant to help them. If a number of teams are competing in a particular game, several research consultants may be provided. The game manager will announce at the beginning of each game the number of consultants available. In addition, he will provide the teams with a vita on each consultant to help them decide which



person to hire for any one task. You may hire a consultant at any point during the game, providing one is available--at any point in time it is possible for all the consultants to be engaged by other teams. The cost of consultant service will vary according to the qualifications of the person concerned. In general, consultants charge for half-hour units at a rate approximately equal to their per diem rate in real life.

Physical Components of the Game

Physically, the FEHR-PRACTICUM game consists of four interacting components: an information bank, a data generator, a message generator, and an in-service training (IST) unit. The function of each of these components is described below:

(1) Information Bank. The Information Bank is actually a cross-referenced file. Historical information about the Fair City system, statistical data about the tests used in the problems and abstracts of the real-world studies

referred to in the problem booklets are bound together by problem (R.F.P.). The Bank may be used as the only reference source in a fast version of the game (but in a slower version, where textual information is important, it should be considered a mere collection of abstracts), or it may be augmented by further research into the original sources and/or other materials. The choice depends on relevance of the problem content to the educational goals of the players involved. Information Banks may be obtained from the game manager at any point in the game.

(2) Data Generator. The data generator is a computer program which simulates the behavior of the individual subjects within our educational system. Each subject is described by a unique set of scores for a large number of variables such as sex, age, number of siblings, sibling position, intelligence and various attitude scales and achievement tests. However, an individual's scores for many tests--especially attitudes and achievement--will change over time. The direction and rate of these changes represent the "behavior" of the individual.

Within the data generator, three types of information gathering processes may be used:

(a) File Search. A file search will retrieve the information which exists in the files of the school system. This may be considered fixed information in that you will get precisely the same scores for each individual each time you search.

(b) Survey. Data which can be obtained by administering a test at the present time is available through a survey. Since measurement error is involved, a survey will return a slightly different test score for each student each time it is used.

(c) Treatment. The treatment process enables the player to administer any available test to subjects at various points in time. Since players may also control which treatments are given to any individual (or group), this process enables you to assess the effects of various treatments experimentally.

(3) Message Interrupts. It frequently happens that a research project is radically changed by external events which the experimenter cannot anticipate or control. For example, a teacher strike which interrupts an experiment may change pupil attitudes as well as introducing costly delays. Such "acts of God" may be introduced into the FEHR-PRACTICUM game by message interrupts. At some time(s) during the game you may be given a message by the game manager. Some of these will be relatively unimportant such as notification of the status of the computer system. Others, however, may require you to make adjustments in your research plan. For example, a message that your research budget has been cut might necessitate the use of smaller samples. Such messages are intended to provide experience in dealing with the unexpected. Message interrupts are an optional feature, to be used at the discretion of the game manager.

(4) IST Units. In real life, a researcher may need extra schooling to enhance his knowledge in areas relevant to his research. Therefore, he might opt to take courses at a nearby university. In the FEHR-PRACTICUM game, such "courses" are called IST units. The in-service training unit consists of a set of instructional materials which provide training in such areas as writing format statements, criterion referenced measurement in research and the like. The "courses" which are available are listed in the Players' Instructions.

FEHR-PRACTICUM research takes place in Fair City, U.S.A. Since the context in which a problem exists frequently has significant implications for its solution, it is important that you read the Fair City booklet before coming to the next session. Please pay particular attention to the sections describing education.

Since you will use the information provided in this booklet in the practice game and in any subsequent games you play, please have it on hand at each game session.

GOOD LUCK! MAY ALL YOUR PROBLEMS BE FEHR ONES!

ADDENDUM:

PLAYER'S INTRODUCTION TO FEHR-PRACTICUM

This addendum appears only in the Game Manager's Manual. It provides an overview of FEHR-PRACTICUM materials, and describes the function of each component and the interrelationships among them.

MATERIALS

The FEHR-PRACTICUM materials can be classified on two broad dimensions. The first of these is the access dimension. Where is the material physically located? How and by whom is it normally accessed? The second dimension concerns the generality of the materials, whether it can be used in all problems (content areas) or not.

The access dimension is sub-divided into four categories. Category 1 contains all the Data Generator materials. These would normally be accessed at the local computer center or a remote terminal. Category 2 contains materials which would normally be used only by the Game Manager and/or those planning the instructional uses of the practicum. Category 3 contains materials which are shared among players. These would normally be accessed in a laboratory-classroom. Category 4 would contain all the materials normally provided to each player-trainee.

The generality dimension contains two categories. Category 1 (common) contains all materials which can be used with all eight problems, while category 2 (unique) contains materials which change from problem to problem.

The entire set of FEHR-PRACTICUM materials, categorized by access and generality, appears in Table 1. In the discussion below, there is additional descriptive information for every component except the Game Manager's Manual which has been described in context.

Common Materials

The Main Data Generator (main computer program) consists of a set of

TABLE 1: FEHR-PRACTICUM MATERIALS CATEGORIZED BY ACCESS AND GENERALITY

ACCESS DIMENSION	GENERALITY DIMENSION	
	1. COMMON TO ALL PROBLEMS	2. UNIQUE CONTENTS FOR EACH PROBLEM
1. COMPUTER CENTER	a. Main Data Generator. (Main computer program.)	a. Data Generator Problem Packet: unique program parameters for each problem (Eight separate packets.)
2. GAME MANAGER	a. Game Manager's Manual Sections I & II	a. Game Manager's Manual: Sections III & IV
3. LABORATORY OR CLASSROOM	a. FEHR-PRACTICUM IST Units. (Five separately-bound units.) Note: Some Game Managers may wish to supply a copy of this material to each player. b. References. (Supplied locally.)	a. Information Bank: material separately bound for each problem. (Eight separate Information Banks.)
4. PLAYER MATERIALS	a. Player's Introduction to the FEHR-PRACTICUM Game. b. Fair City, U.S.A. c. Player's Instrucions for FEHR-PRACTICUM.	a. RFP (Request For Proposals) Document: a specific description of the particular problem to be investigated, separately bound for each problem. (Eight separate RFP documents.)

punch cards (or a computer tape) containing the FORTRAN IV source program. However, the main program cannot produce simulated data unless it is combined with one of the data generator problem pockets (see below).

The FEHR-PRACTICUM IST (In Service Training) Units consist of separately-bound, semi-programmed materials which provide detailed instructions for accomplishing specific tasks encountered in the practicum. The five units available are:

I. Assessing Success For Complex Objectives.
II. Criteria-Referenced or Mastery Testing.
III. Computer Format Statements for FEHR Data.
IV. Sampling The Subjects To Be Studied.
V. Using The FEHR Secretary.

The references to be supplied locally consist of any research-oriented materials which will assist the player-trainees. A list of suggested titles appears in a subsequent section.

There are three player's materials which are common to all problems. All three of these materials appear in this manual. The first, Player's Introduction To The FEHR-PRACTICUM Game, was contained in the first twelve pages of Section II, which you have just read. The second and third booklets, Fair City, USA, and Player's Instructions For FEHR-PRACTICUM constitute the second and third chapters of Section II. Wherever necessary, the original materials printed herein have been supplemented by notes and addenda addressed to the Game Manager.

Unique Materials

The total FEHR-PRACTICUM system provides a choice among eight major problems* dealing with eight different content areas and involving students at different educational levels. Each problem has its own unique Data Generator Problem Packet, Information Bank, and RFP (Request For Proposals) document. Although the specific contents differ, the format of each of these components is the same for all problems.

The Data Generator Program Packet combines with the Main Data Generator (above) to form the complete computer program necessary to operate a specific problem. When the first order is received from a new user, an intact deck

* Problem 5 has been deleted from these materials because of intractable problems in simulating data at discrete time periods.

containing both the Main Data Generator and the Data Generator Packet for the standard REMAR (Remedial Arithmetic) problem is shipped. When you are familiar with this problem new ones may be ordered one at a time. Since the main sections of the program are common across problems, we routinely ship only the Data Generator Problem Packets to users who already have one or more FEHR problems operational.

The Information Bank contains a brief summary for a number of real-life articles related to the content area of the problem, plus descriptive information for each of the standaradized tests available in the problem. These are printed on loose-leaf sheets, one article per page, and arranged alphabetically by author. This format was adopted to permit users to update the information as new relevant research becomes available.

The RFP document for each problem has the same general form. Page 1 identifies the content area and the educational agency which is sponsoring the research. Page 2 provides a general narrative description of the problem and refers the reader to an appendix from which more specific details may be obtained. Pages 3 to 6 contain the checklist of Tasks to be Performed: a detailed listing of all the tasks involved in a complete practicum. The Game Manager chooses those tasks best suited to the local needs.

The detailed content of each RFP is contained in a set of appendices. These are usually five or six appendices containing the information described below:

Appendix I - Information Bank Material. This is a list (or index) of all the abstracted articles which come along with the simulation. Going through these articles will give the player an overview of the research in the area. If a player is especially interested in the substantive area to be investigated, we suggest that the Information Bank be used to determine which articles should be read in full. In addition, the Information Bank provides normative data (means, standard deviations, reliabilities, etc.) and a description of the test content for all standardized tests listed for that problem. In addition, for many tests a critique is also available in the Information Bank.

Appendix II - Research Population. Appendix II contains a complete list of all subjects available in the problem and explains how to

interpret the student ID.

Appendix III - Catalog of Treatments. Appendix III is a list of the treatments which can be administered in the problem, a list of costs of each treatment, and a definition of the time sequences used in the problem.

Appendix IV - Catalog of Variables. Appendix IV lists all the variables available in the problem, the costs of each variable score, and the conditions under which the variable scores (test scores) may (and may not) be obtained.

Appendix V - Committee Report. In nearly all problems there is some preliminary information available such as why particular treatments were chosen and what previous research the school system has done in the area. A concise summary of this information appears in Appendix VI.

OVERVIEW OF AVAILABLE PROBLEMS

A total of eight problems are available in the FEHR-PRACTICUM system. Once the Game Manager and research consultants have become thoroughly familiar with the FEHR-PRACTICUM system, it is possible to conduct a practicum in which several problems (indeed, all eight) are being operated simultaneously. This has the advantage of permitting player-trainees to choose the area closest to their own substantive interests. Although the problem-solving procedures are similar from problem to problem, we have found that the choice of content area can make a tremendous difference to a trainee's motivation. However, managing FEHR-PRACTICUM is a complex task. We strongly recommend that new users not operate multiple problems until they have had at least two or three sessions practice with a single problem.

During our field validation studies, we tried training Game Manager's on several different problems. It was our experience that prospective Game Managers who were supervising problems based in a content area with which they were unfamiliar had great difficulty concentrating on the management tasks per se, and consequently learned much more slowly than those supervising problems with which they were familiar. Since it was also found that numerous demonstration file searches, surveys, and field experiments facilitated

learning, it was decided to develop training materials based on one standard problem and featuring many practical examples. The REMAR problem was chosen for this purpose because remedial arithmetic is the one content area with which most educators have had some experience. Section III of this manual contains programmed directions and a number of practical examples for each task in the REMAR problem. After completing this section, most people will have no difficulty administering a full-fledged practicum session using the REMAR problem. The extension to other problems is then just a matter of becoming familiar with the content area by going through a complete practicum following the Player's Instructions step by step.

The eight available problems are described below, beginning with the standard REMAR problem. For your convenience, the instructional strength and limitations of each problem are listed under the heading Special Characteristics. For sessions in which the specific content of a problem is of substantive interest, we strongly recommend that copies of the primary references listed with the problem be made available.

Project REMAR Remedial Arithmetic. (RFP002). This is the standard problem used for the first implementation at a new site. The RFP is issued by the Fair City School Board, who are concerned at the growing number of grade seven students who cannot do arithmetic computation well enough to succeed in the regular grade seven curriculum. You are asked to conduct field tests to evaluate the effectiveness of three proposed new remedial arithmetic programs as compared to the current practice. At the conclusion of the project, each team must decide on the basis of their experiment which of the new program (if any) are to be implemented. (Note: it is entirely possible to recommend different programs for students of differing characteristics.)

Particulars: Variables = 78, Treatments = 4, Total Research Population = 1906 seventh grade students from seven junior highs, each with several classes.

Special Characteristics: This problem permits direct experimental comparisons. It is fairly heavily orientated toward criterion-referenced tests or sequential mastery tests. Sampling, selection of

variables, and design all are involved and can be accomplished fairly easily. Because of the necessity to select only the poor students, this problem provides a rich opportunity to study the effects of statistical regression. In addition, there are some conceptual difficulties with respect to the precise definition of success in terms of variable scores, and some sticky statistical questions centering around the analysis of mastery-test data. Nevertheless, this is perhaps the easiest, most straightforward problem, since the objectives are fairly clearly defined in unambiguous terms.

A unique feature of this problem is the emphasis on the cost-effectiveness aspect of the decision among programs which is introduced by a wide disparity in program costs and a positive correlation between cost and learning.

Primary References (None)

Project PEP: Perceptual Education Problem, RFP001. The term "perceptually handicapped" has been used in recent times to identify a large number of children who have normal intelligence but because of a "perceptual problem" have great trouble in school, particularly in reading and writing. In this problem the players are requested to aid the Board of Education and a committee of teachers in deciding such questions as: Does Fair City need a Perceptual Education Program: Are psychological and socio-economic variables relevant? Which treatment should be recommended?

Particulars: This problem has 161 variables, three treatments (2 experimental, 1 control), and a total research population of 426 students in four grades of one school.

Special Characteristics: This problem permits a direct experimental comparison of the two proposed programs with present practice (the control). It features the usual sampling, variables selection, and design difficulties, with emphasis on the last two. One of the major difficulties in PEP is problem definition. The School Board sees the problem as a lack of achievement. How does that relate to "perceptual handicaps"? What is a perceptually handicapped child? What variable scores signify a handicap? The conflict between end-result variables (achievement) and intermediate results (changes in

variables which are hypothesized as pre-requisite to successful achievement) make this problem particularly useful for practicing problem conceptualization skills. An additional feature is the "built-in" experience with regression toward the mean which is caused by stringent selection criteria.

Primary References:

Frostig, Marianne. "Visual Perception in Brain-Injured Children." American Journal of Orthopsychiatry, 1963, 33 (4), 665-671.

Johnson, J. & Myklebust, H. R. Learning Disabilities: Educational Principles and Practices, Grune & Stratton, New York, 1967.

Kephart, Newell C. (U. of Purdue, Lafayette) "Perceptual-Motor Aspects of Learning Disabilities." Exceptional Children, 1964, 31 (4), 201-206.

McCarthy, J. J. & McCarthy, J. F. Learning Disabilities, Allyn & Bacon Boston, 1969.

Project HEADSTART: Early Childhood Education. (RFP004). The Fair City School District believes that there are a growing number of children who are entering first grade ill equipped to perform at normal levels. In this problem the players must aid the Board of Education in deciding if a Headstart program should be introduced and which particular program best meets the needs of the Fair City children who require extra attention. The players should not only decide if there is a need but also if the gains made in Headstart are retained after the child has entered the regular public schools.

Particulars: Variables = 78, Treatments = 7, Research Population = 1822 or all three-year-olds in the city.

Special Characteristics: Although direct empirical comparisons among the 7 treatments are possible, this is too complicated to permit in practice. An additional complication is the fact that not many measures are available for pre-school kids, let alone many reliable ones, particularly those which may change as a result of some program. In addition, the problem requires long-term (longitudinal) assessment of changes, and most available tests -- even though they have the same name -- have different norms for different age groups.

Primary References:

Weikert, D. "The Perry Preschool Project in Ypsilanti, Michigan," 1969, OE-37035.

Project READ: Reading Assessment Problem (RFP005). The teachers of the primary grades have become dissatisfied with their present reading program because of the increasing number of students who are falling behind their peers in the development of reading skills. In this problem the players are to aid the teachers and principals of the elementary schools to determine if a new reading program should be instituted in Fair City. One of the questions they will answer in this problem is whether there is one curriculum which can best meet the needs of all Fair City children.

Particulars: Variables = 170, Treatments = 3 (2 experimental, 1 control), Research Population = 2000.

Special Characteristics: This problem permits direct experimental comparison. The major emphasis here is assessment in terms of multiple behavioral objectives. About half the variables in this problem are criterion-referenced. Consequently, variable selection is an important element in this problem. But perhaps the major feature is the data interpretation task. The multiple successes and failures of students in various programs must somehow be summarized in a conceptually meaningful way to permit program-to-program comparisons, and a subsequent decision among programs.

Primary References:

(Not used in development, but very similar and helpful)

Duffy, G. G. & Sherman, G. B., Systematic Reading Instruction, Harper & Row, 1972.

Project TQUEST: Validation of a Teacher Questionnaire (RFP006). The purpose of this project is to validate a questionnaire which "evaluates" teacher performance at the college level. The questionnaires are to be administered to students presently enrolled in college classes. The players are to assist the administration in this project by comparing the effects of feeding back information from various sub-scales on the new questionnaire. A second questionnaire and several achievement scores are also available to be used in the validation task.

Particulars: Variables = 60, Treatments = 4 (3 types of feedback, 1 no feedback), Research Population = 512 university students from 20 different classes.

Special Characteristics: This problem contains two questionnaires: (1) the old questionnaire, and (2) a new one designed to provide more information. It opens up quite a can of worms -- how does one validate such a thing as a student evaluation of teachers? In this problem, the path suggested is to see how effective the questionnaire is in changing professors' teaching, as measured by the questionnaire. The variables (questionnaire items) are all 5 option attitude items. Individual item responses may then be combined to form various scales which relate to the developers' (i.e., the University Committees) concept of teaching effectiveness. Feeding back to a professor his "scores" on one or more of these scales from last semester should influence his score (on the scale(s) concerned) this semester. Thus it is possible to collect evidence of the construct validity of the questionnaire.

It is important to note that, while we give questionnaires to students, the unit of observation is a teacher (i.e., the class). This introduces a variety of interesting statistical questions which are an important aspect of this problem.

Primary References:

Cronback, L. J. Essentials of Psychological Testing, Chapter 5, "Test Validation", Third Edition, Harper & Row, 1970.

Project RMA: Remedial Math for Adults (RFP007). The open enrollemnt policy and the wide variety of people who attend community colleges necessitates the provision of additional support services for students and citizens. In this problem the players are requested to evaluate the remedial math course at the Fair City Community College. This course is intended to provide the students taking it with the skills to do college level work. The players will be asked to answer such questions as: Does a remedial program work for adults? For what kind of person is this program least useful? How can the program be made more effective and efficient? Should the course be continued?

Particulars: Variables = 26, Treatments = 1, Research Population = 251.

Special Characteristics: This problem is strictly a post-hoc evaluation task, with evaluation made solely on the basis of evidence collected during the semester. The trickiest part of this problem is an operational definition of success. Since the students come from a wide variety of backgrounds, and have very different goals, the meaning of success varies from group to group. The selection of relevant variables can also get immensely complex, since there are several varieties of attitude, aptitude, and achievement measures which the teams might be used in any combination.

Primary References:

Dalke, Richard M. A Case Study of an Individualized Course in Arithmetic at a Community College. Dissertation, University of Michigan, 1971.

Project BUS: Busing to Achieve Integration (RFP008). In response to recent Supreme Court rulings, the Fair City Board of Education has decided to integrate the city's schools through busing. As in most cities, the people of Fair City have very strong views about busing and there are many complications to consider. In this problem the players are requested to evaluate the effects of busing in the city's elementary schools to determine its advantages and disadvantages and what are the sources of the problems that exist.

Particulars: Variables = 52, Treatments = 1, Research Population = 3,633 pupils in grades 1 and 4 of 21 different schools.

Special Characteristics: This problem is strictly a post-hoc evaluation. Teams are called in after the busing decision is made. Although only the first and fourth graders are available to the players, there is nevertheless a large number of subjects from a wide variety of socio-ethnic neighborhoods. Since computer costs prohibit an exhaustive survey, this problem offers a rich environment for practicing sampling skills. There is the fact that any results may be attributable to the new organization in the elementary schools rather than the busing plan itself. There is also extensive direct measurement experience, since it may place more weight on attitude measures

as criteria. The relatively low reliability and validity of such measures and the categorical nature will necessitate the construction of broader construct variables through various combinations of questionnaire responses.

Primary References:

Sullivan, Neil U. and Steward, Evelyn A. "Now is the Time: Integration in the Berkeley Schools," Indiana University Press, Bloomington, 1969 (ERIC).

Project EXTSY: Extended School Year (RFP003). What are the benefits of an Extended School Year? Fair City, like many other areas, believes there would be economic if not educational benefits from having the school schedule reorganized so that the schools are in operation all year around. The players are to investigate the situation and determine which, if any, schedule has the most advantages for Fair City.

Particulars: Variables = 56, Treatments = 3 (2 experimental, 1 control), Research Population = 12,393 students from 21 elementary schools.

Special Characteristics: This problem permits some experimental comparison, but notice that an entire school must be assigned to any one treatment. This introduces some interesting questions with respect to the appropriate unit of observation and the generalizability of results. EXTSY involves extensive sampling, variable selection, and design problems. One of the difficulties in this problem is the fact that since treatments must be administered to intact schools, no true experimental design is possible. Attitude variables may be more valuable here, but reliability and validity problems, as well as the nominal nature of such data, are problematic. The fundamental question is "which is more important: achievement, cost, or popularity?" Several unique aspects of this problem are introduced by its longitudinal nature (3 years).

Primary References:

Department of Education, New York. "The Impact of a Rescheduled School Year." A special report prepared for the Governor and the Legislature of the State of New York. The University of the State of New York, the State Education Department, Albany, New York, March, 1970, 158 pages.

The Environment For FEHR-PRACTICUM Problems:

FAIR CITY, U.S.A.

The Friendly City

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Table of Contents

THE FRIENDLY CITY 3
Introductory Message from the Fair City Chamber of Commerce
FACTS AND FIGURES 5
CITY GUIDE 6
Map of Fair City 7
GOVERNMENT 8
THE QUARTERS 9
THE PEOPLE 11
The Location of Neighborhoods in Fair City (Map) 11
EDUCATION 12
School Population 12
Administration 12
Teachers 12
Location of Schools in Fair City (Map) 13
Elementary and Secondary Schools 14
Special Programs 15
Parent and Community Involvement 15
Utopia State University 16
Fair City Community College 16
HEALTH AND WELFARE 17
GOOD TIMES 18
APPENDIX 19
Maps and Tables
Table 1 - Fair City, U.S.A. 1970 Census, By Census Tracts .. 20
Table 2 - 1970 Population by Age 20

Map of Neighborhoods Shown by Census Tracts 20
Table 3 - Location of Schools by Census Tracts 21
Map Indicating the Location of Schools in Fair City 21
Table 4 - Public School Enrollment by Schools, Last Year ... 22
Table 5 - Public School Enrollment by Level and Race, Last Year 23
Table 6 - Percent of School Age Population Enrolled in Public Schools: Last Year 23
Table 7 - Enrollments by Senior High School Districts: Last Year 23
Table 8 - Student-Teacher Ratio 23
Table 9 - Statistics on Classroom Teachers 24
Table 10 - School System Staff 24
Table 11 - Population Distribution by Race: 1950-1970 25
Table 12 - Economic Characteristics of the Population: 1970 25
Table 13 - Population Mobility: 1960-1970 25

The Friendly City

This book is a gift to you from the Chamber of Commerce of Fair City, U.S.A. If you now live, work, or transact business in our city, or intend to do so in the future, this book should prove both useful and interesting to you. It contains information about our people, quarters, government, municipal services, commerce and industry, health and welfare, theater and the educational system.

Friendship is the foundation of Fair City's vitality and strength. Wherever this spirit appears in the pages to follow, something of benefit to the whole community has been accomplished. Whenever the spirit of friendship appears in the future, we will accomplish more. In Fair City, "the friendly city", we have struggled upward by friendly co-operative effort, and if we are to move forward, it will be by the same means.

FC
CC

Fair City
Chamber of
Commerce

FACTS & FIGURES

POPULATION: Fair City - 122,594

AREA: City - 31 square miles

TEMPERATURE MEANS:

Minimum - 37.3°
Maximum - 60.8°
Mean - 45.1°

PRECIPITATION:

Rain - 33.7 inches per year
Snow - 40.6 inches per year

GOLF COURSES: Three 18 hole courses

WORK FORCE: 53,849, including 17,000 in manufacturing industries

PAY RATES: April 1970 average manufacturing pay - $3.03 per hour ($119.99/week)

MANUFACTURING INDUSTRIES: 112

RETAIL AND WHOLESALE OUTLETS: 747

SCHOOL ENROLLMENT: 23,883 (last Fall)

PER CAPITA INCOME: $2,348 (1970)

MEDIAN FAMILY INCOME: $6,943 (1970) (national average: $4,630)

RETAIL SALES: $192,967,000 for Burns County, including $150,185,000 for Fair City (1970)

NEW HOUSING VALUE: $6,896,942 (1970)

BUILDING PERMITS VALUE: $19,957,709 (1970)

HOSPITALS: 1- Total bed capacity 545

HOTEL AND MOTEL ROOMS: 600 (air conditioned)

BROADCAST FACILITIES: Four radio stations, two TV stations and cable TV

NEWSPAPERS: Star-Gazette (daily circulation of 50,000), Burns County Reporter (weekly distribution of 1400)

RAILROADS: Erie-Lackawanna, Central

BUS LINES: Four intercity and one county line

TRUCK LINES: 35 carriers to all principal cities

AIRPORT: Burns County Airport

SHOPPING AREAS: 5 principal ones

TOURIST SIGHTS AND HISTORIC ATTRACTIONS:

Early American Brewery
Harding's Summer Home
Fegans Art Gallery
Cervenka Gallery - Utopia State
Burns County Historical Center
Mohawk Battlefield Reservation

TOTAL PROPERTY TAX RATE (1970):
(per $10,000 unit of full value)
Ranges from $205.15 in less populated areas to $467.95 for full service areas

CHURCHES: Over 100 churches representing 24 denominations, all major faiths

SCHOOLS:

Public - 21 elementary schools
7 junior high schools
3 senior high schools

Parochial - 5 elementary schools
1 senior high school

City Guide

Fair City, U.S.A., is a modern American city of today--and tomorrow! With its combination of the best aspects of city living and ready access to the beautiful Burns County countryside, Fair City is the place for YOU to live!

The city itself is crossed by two rivers: the North River flows through the heart of the industrial district and the South River lends graceful charm to the municipal area as it winds its way through the historic site of the city.

INDUSTRIAL AREA

Both rivers flow toward the city from the surrounding countryside. The North River flows through the scenic valley northwest of the city; the parks and picnic sites in this area attract many of the citizens of Fair City during their leisure hours and vacation days.

MUNICIPAL AREA

The South River runs through the rural area southwest of the city past the many picturesque farms that dot the landscape.

East of the city, the rivers converge near the new shopping mall that has provided the Fair City residents with year-round, climate-controlled shopping, banking, eating and entertainment.

City Map

BY CENSUS TRACTS

Government

Fair City's municipal government is a general purpose government operating under a charter adopted in 1908. The governing officials are the mayor and a seven-member City Council; they are elected at-large in November of even-numbered years.

The city has been alternately governed by Republicans and Democrats for the last twenty years. The first black to be elected to the City Council was John Newton, in the last election.

The incumbent mayor, Frank Friendly, is a Democrat. He prides himself on the city's progressive attitude toward contemporary urban problems and the extent of citizen participation in community affairs. His current term of office expires in two years.

Membership on the present City Council is as follows:

NAME	PARTY	STATUS
Lewis Left	Democratic	Appointed, 1960; Reelected three times
A.M. Biguous	Democratic	Elected last year
Stanley Staunch	Republican	Appointed, 1968; Reelected twice
A.H. Lucre	Democratic	Elected, 1966; Reelected once
John Newton	Democratic	Elected last election
Harvey Halfway	Republican	Appointed, 1966; Reelected twice
Reginald Right	Republican	Elected, 1966; Reelected once

The Fair City Council meets at least weekly and often more frequently. Disagreement and debate are common in Council meetings. Citizen groups are often heard. Council members are not reluctant to take public positions on issues and air them at Council meetings or in the press.

CITY HALL

THE QUARTERS

The residents of Fair City represent a wide variety of ethnic groups. Currently, the population is 62% white and 38% non-white; the non-white population has been increasing slowly over the past 20 years (Appendix-Table 11).

Fair City, like all large cities, has citizens belonging to many socio-economic levels and this fact is reflected in housing. The homes in the city range from the modern high-rise apartment complexes near the new shopping mall, to the lovely old homes found in the center of the city, to the more modest middle-income dwellings in most of the city, to the large but dilapidated homes on the south side of the city.

Recently, some attempts at urban renewal have been made in this last area; notable among them has been the construction of several hundred units of low-income housing near the South River.

MODERN HIGH-RISE APARTMENT COMPLEXES

NEAR THE NEW SHOPPING MALL

Franklin Park, a quiet neighborhood near the center of town, consists of charming old homes on spacious lots. The residents of this predominantly white, upper-middle class area, tend to be engaged in professional, managerial and technical occupations.

Fair Valley, although close to the industrial area, is a pleasant section, with small homes and apartments. The majority of residents are white, of lower-middle class status, and are generally employed as clerical or skilled workers.

Bakersfield, named for one of Fair City's leading industrialists, was originally developed by Mr. Baker's company for his factory employees. The modest but neat houses are still inhabited by factory employees, both skilled and semi-skilled. This lower-middle, to upper-lower class section is fully integrated.

Shady Terrace and North End both consist of very small, inexpensive houses and apartments. Shady Terrace was a low-cost housing development, while North End evolved independently. They are both resided in by black and other minority persons, of upper-lower class status, who are generally employed as semi-skilled or unskilled workers.

Washington Heights, the most exclusive section of town, is a predominantly white, upper-class neighborhood. It consists of large, custom-designed houses on secluded streets and modern high-rise apartments. Most of the residents are engaged in professional and executive managerial occupations.

Iroquois Village is much like Franklin Park, with its lovely old homes and beautiful landscaping. The middle and upper-middle class, predominantly white residents, tend to serve as managerial, technical and professional people.

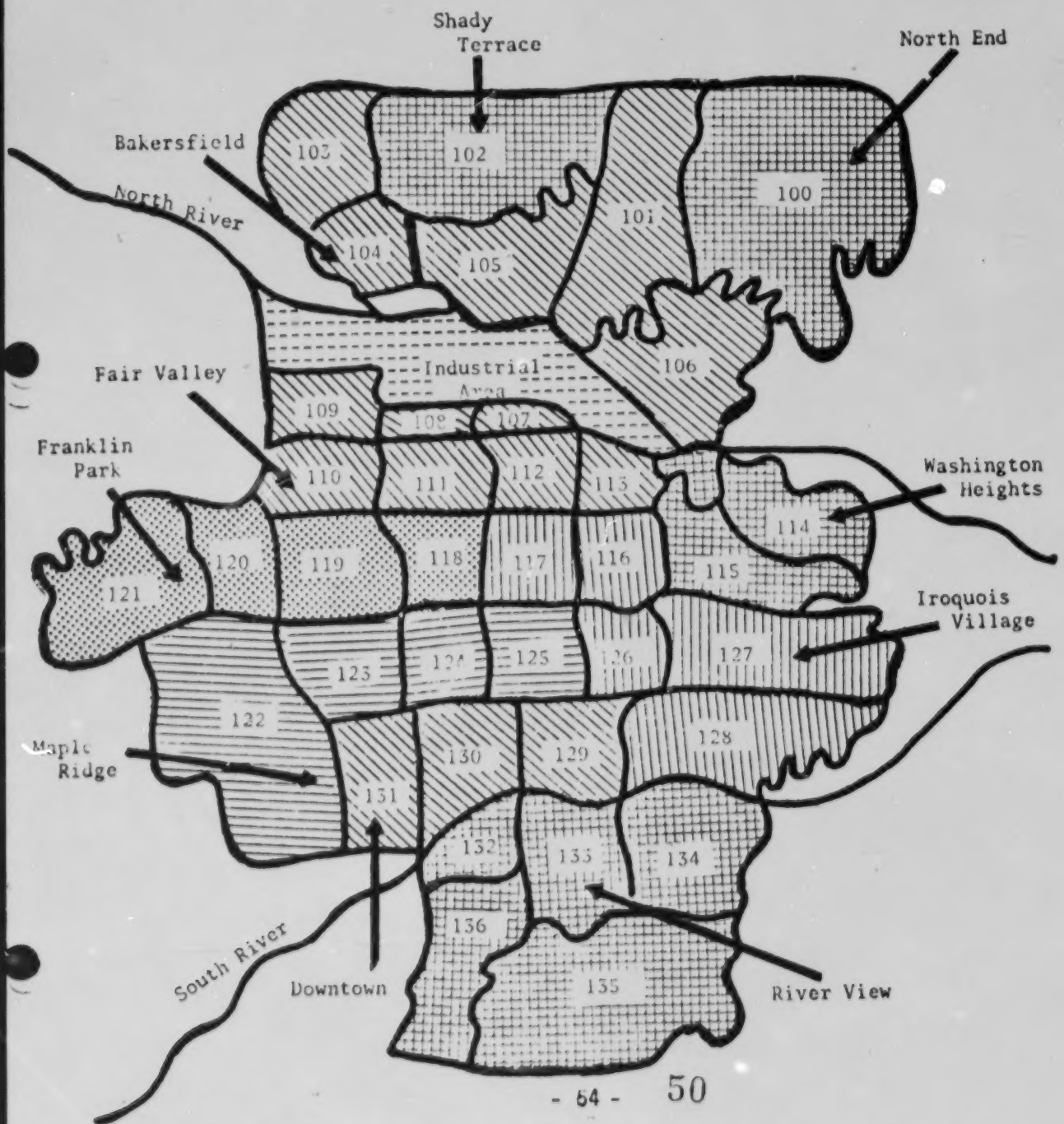
River View, a once-wealthy, old neighborhood now in decay, is inhabited by black and other minority persons of lower-class status. These people are employed as unskilled workers, although a large number are unemployed and receiving welfare. Some of the welfare recipients occupy the urban-renewal housing projects which were recently built in the area.

The Downtown area is the center of town, with both business and residential areas. This integrated area is the home of lower-middle class people, generally employed as skilled or semi-skilled workers.

Maple Ridge, is an integrated neighborhood, including apartment buildings, duplex homes, and single-family dwellings. Its middle-class residents are generally engaged in managerial, sales and service occupations.

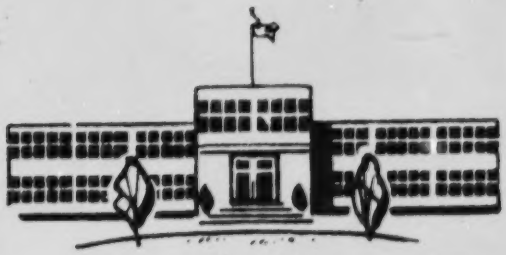
THE PEOPLE

More than 50,000 residents of Fair City are employed in a variety of occupations, ranging from the products produced by the factories along the North River to the research enterprises associated with Utopia State University. Currently, more than 93 percent of the total work force is employed, giving the city an average household income of $6,943. Below is a map indicating the location of the various neighborhoods comprising Fair City.



Education

COMMUNITY SCHOOL– OBJECTIVES AND PROGRAMS



The Fair City school system is typical of a system which has grown steadily in recent years. It has many of the characteristics of a small system in which the community and parents are vitally concerned and interested in the operation of the schools, and teachers are dedicated and honored citizens of the town. Yet with the gradual increase in the population, especially in the black population, the school system has had to reorient itself.

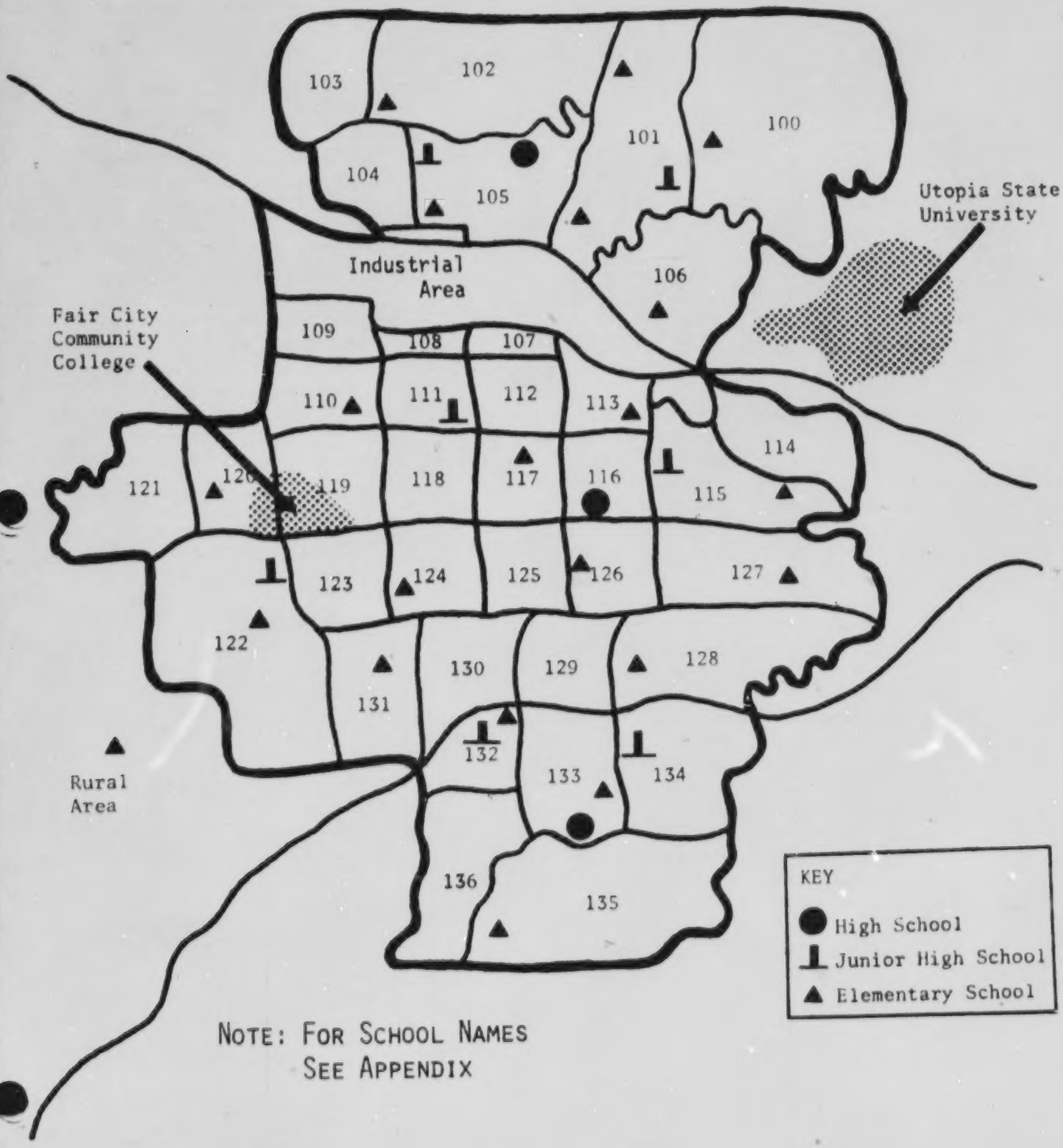
SCHOOL POPULATION: In 1970, the school system population contained 23,883 pupils of which 36% were black (Appendix-Tables 4 and 5). The lower class areas contained predominantly black pupils while the upper middle class areas contained few, if any, black pupils. This can be seen by comparing the map on the opposite page with the map on page 8. Recently, this trend toward separation of the races has been quickly reversed in the lower middle class areas, but some work is needed to alleviate the possibility of problems in other parts of town. Several plans have been considered by Fair City to help solve this racial imbalance, but one has not been proposed which satisfies the various factions within the city.

ADMINISTRATION: The new superintendent, Mr. A. Lumnus was a graduate of the school system here. He attended the largest and oldest elementary school, Jackandjill Elementary, as well as Gordon Junior High and Ives High School. Mr. Lumnus was brought in from an urban school system so that he could deal with situations such as racial imbalance in the Fair City schools. Fair City considers herself fortunate to have a superintendent who has feeling for the town and expertise in his area. His staff consists of several assistant superintendents and other special assistants to aid in the task of organizing and directing the growing school population (Appendix-Table 10).

TEACHERS: The teachers in Fair City are extremely well qualified and rank above the national statistics in their educational attainment level and in salary (Appendix-Table 9). This has been largely due to the strong teacher's union, which has attracted able and dedicated teachers. These teachers tend to be creative and innovative because of the recent policy initiated by the union and accepted by the school board that gives wide latitude to the teachers in their approach to subject matter and their management of the classroom unit. The teachers wield much influence for the good of the children. Their latest struggle has been to decrease the pupil-teacher ratio from an average of 28 to 1 to 23 to 1, but as yet the cost is too great for such a change.

SCHOOLS: The school system has grown by almost 72% since 1950 and now contains 21 grade schools, 7 junior high schools and 3 senior high schools (Appendix-Tables 3 and 11). The school year is 39 weeks long, beginning in September and ending the middle of June. There has been some discussion of instituting an extended school year but this plan is only in a preliminary

MAP INDICATING THE LOCATION OF SCHOOLS IN FAIR CITY



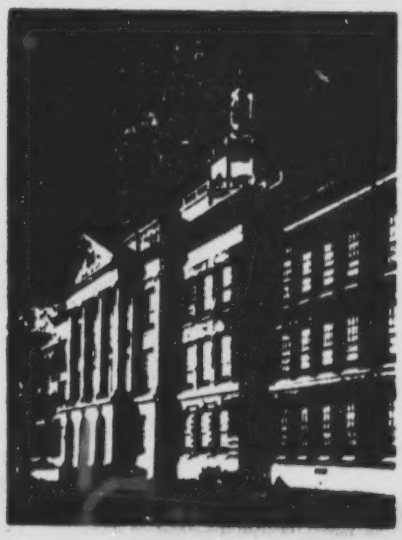
NOTE: FOR SCHOOL NAMES SEE APPENDIX

research stage now, and there are some groups strongly opposed to the plan.

Elementary schools have self-contained classrooms in which the teacher is in charge of all students. A few specialists are employed for the schools, but mostly for remedial work with slow learners. Recently, teachers have been encouraged to vary their programs to meet individual and group needs. Several "semi-open" classrooms were tried in the schools last year, which seemed to work successfully for some of the teachers.

JACKANDJILL ELEMENTARY SCHOOL

The junior and senior high schools are departmentalized and children are grouped by academic achievement and ability in most areas of study. In the junior and senior high program, there are 3 groups of students: (1) college preparatory superior, (2) college preparatory regular and (3) occupational preparatory. Students are chosen for the superior class on the basis of (a) grades, (b) initiative and (c) teacher recommendations. Pupils elect whether they are in college preparatory regular or occupational preparatory, but counseling is available at every level to guide pupils in making their choice. Approximately 15% of all Fair City pupils are classified as college preparatory superior; another 40% are regular college preparatory. The occupational preparatory contains 45% of the pupils and serves them well in preparing them for occupations immediately upon high school graduation. There has been some pressure to make the preparation for jobs more relevant to Fair City. At the present time, negotiations are taking place with various companies in Fair City to place high school students in internship programs for a small portion of the high school occupational program. This would mean a great change in the educational framework, since students will leave the school, and is therefore being given careful consideration.



IVES HIGH SCHOOL

SPECIAL PROGRAMS: In the last ten years, Fair City has instituted special classrooms in some of the elementary, junior high and high schools for children with various physical or mental disabilities. There are programs for the physically handicapped, the mentally retarded and the emotionally disturbed. There has been a small movement to end such classrooms because of the stigma attached to the label, but the Fair City School Board is committed to their usefullness.

A small Program Headstart began two years ago in Fair City in the black area of town. Since it was a small program and an experimental one, no formal results were compiled by the administrators of the program. Kindergarten teachers did report that children who attended Headstart seemed to adjust to school more easily. Fair City hopes to have a larger, more comprehensive Headstart Program in the future, which could stem the rising concern over the poor achievement and IQ scores in the poorer sections of the town.

PARENT AND COMMUNITY INVOLVEMENT: Fair City has a long tradition of community involvement and support of the school system. In past years, they have supported land and millage issues overwhelmingly. Recently, there has been a decline in support of millage and bond issues, and last year, the millage renewal was voted down. The city schools now feel that they must form a closer relationship with the parents, especially since the school costs and complexities have grown rapidly in the recent years. Mr. Lumnus has begun a concerted effort to encourage parents to visit the schools and talk to the teachers and principals. He has urged the P.T.A. to actively recruit members and to make each member a vital part of the school. This has been moderately successful in the middle class areas, but the lower class areas have shown little interest in participating in any organized group.

In order to further good relations, the school board has set up a vehicle for community and parent complaints about the schools. All complaints received are considered seriously, and those that are legitimate are acted upon immediately. This vehicle is a committee which works directly with the parents and the school board with a minimum of bureaucratic delay involved.

Another project which has proven extremely beneficial for the school and the parents is the use of mothers as teachers' aids in situations where the teachers are overburdened by the number or kind of children in a classroom. These teachers' aids are extremely effective in giving individual or group remedial help to children, while the classroom teacher is engaged in teaching the other children. It is hoped that this program could be expanded to include all the schools in Fair City. As it stands now, only half the schools are served by these teachers' aids.

A poll taken by the university showed that 80 percent of parents of children in Fair City schools felt their child's teacher was doing an average or better job; 91 percent felt the teacher was qualified. Findings toward the principals and other administrators were similar.

Certain groups of parents, especially those in black or low income areas, showed a higher degree if dissatisfaction. For instance, 39 percent of the Fair City parents felt the school was not doing an adequate job in preparing their children for a job or for college; while in the black and low income areas, 52% of the people felt dissatisfaction with the preparation the children were receiving in the schools.

UTOPIA STATE UNIVERSITY: The Fair City campus of Utopia State University was built in 1950 as the second largest and one of the most beautiful college campuses in the state. It is situated among the rolling hills on the edge of the city, in view of the winding North River. It is a co-educational institution with approximately 15,000 full-time students. In recent years, more than a dozen new and striking buildings have been added to the 32 acre campus. The

UTOPIA STATE UNIVERSITY

school prides itself on its high academic standards. Nearly half the faculty has doctorates and the student-faculty ratio is 15 to 1.

U.S.U. initiated a new curriculum in 1967 with emphasis on independent study and study initiative. A variety of special programs is offered to meet the needs of the students with different abilities and interests. Among these programs is the junior year abroad, semester in Washington, D.C., and other special programs which also allow residents of Fair City to enroll in courses of their choice for little tuition.

FAIR CITY COMMUNITY COLLEGE: Fair City Community College was built in 1968 to meet the needs of the industrious and striving citizens of the town who wanted further education to supplement their skills in their present jobs or to prepare themselves for future jobs. Already, there are 2,500 part-time students and 250 full-time students at the college. The teachers are prominent citizens of Fair City who wish to impart their knowledge to others. The student-teacher ratio is 20 to 1 and in many cases teacher aids are recruited from the group of former students so that each student can get individual attention when he needs it. There are no prerequisites for entering Fair City Community College, except the desire to learn.

The college offers associate degrees in chemical, mechanical and industrial technology; business, finance and remedial courses; and two-year courses in liberal arts and sciences transfer programs. This kind of educational facility has greatly benefited the economic prosperity of the community. Its new president, Mr. U. Tilitarian, has a close relationship to the community and its needs, and is in constant touch with the inner workings of the school and its usefullness to the community.

HEALTH & WELFARE

The Fair City Health Department is governed by the Board of Health. The department provides a variety of services to the city. It conducts immunization programs for children; gathers vital statistics; regulates sanitation, food processing and insect control standards; coordinates programs in health education; and operates several clinics in the city which provide medical, dental and laboratory services.

The County Welfare Department aids a variety of citizens who are in need of assistance. Under various government programs, the department helps the blind, disabled, dependent children, the aged and the unemployed. It aids others in finding jobs, in gaining legal services and in finding adequate housing. The department is especially concerned with the school children and provides assitance to those who are needy by offering free lunches and free medical care administered through the schools.

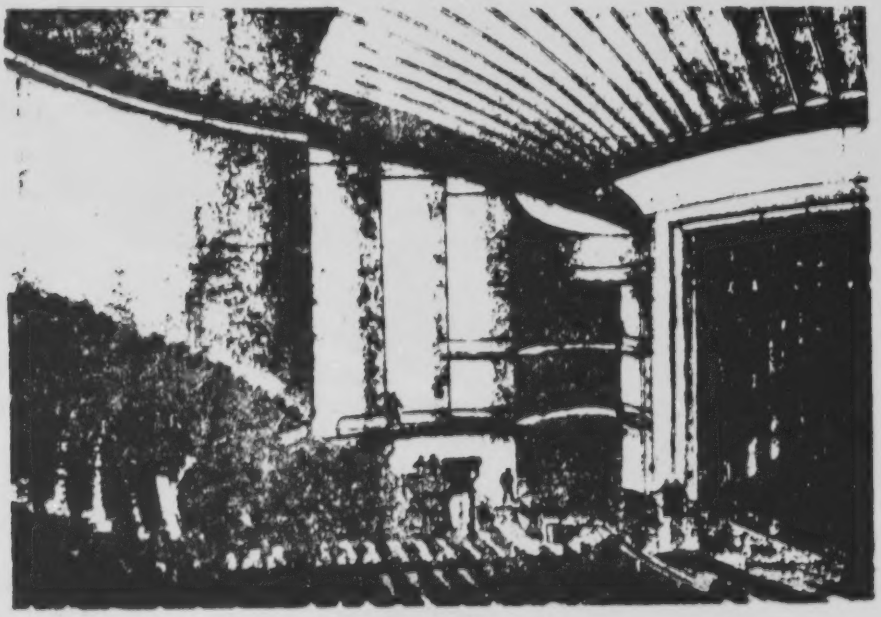
The health care of its people has always been a prime concern in Fair City. The Good Samaritan Hospital has been a symbol of this concern. It was built in 1910 as one of the first hospitals in the state. From that time on, it has continued to be a leader in innovative techniques and in attracting qualified staff. Utopia State University has a fine nursing program, which has been long connected with Good Samaritan.

At the present time, the county has tentatively approved the building of a children's hospital in Fair City, which would add further to the good health care here. Care for the poor is also provided by Good Samaritan at a cost commensurate with their income. The Welfare Office in Fair City keeps accurate rolls of people in need.

GOOD SAMARITAN HOSPITAL

GOOD TIMES

The residents of Fair City enjoy all of the cultural and recreational benefits of metropolitan living. The Fair City Symphony provides the finest in musical entertainment and the city's many parks and playgrounds offer space for relaxing for young and old alike.



McTRIMBLETOE AUDITORIUM

PARK NORTHWEST OF FAIR CITY

APPENDIX

NEIGHBORHOODS SHOWN BY CENSUS TRACTS

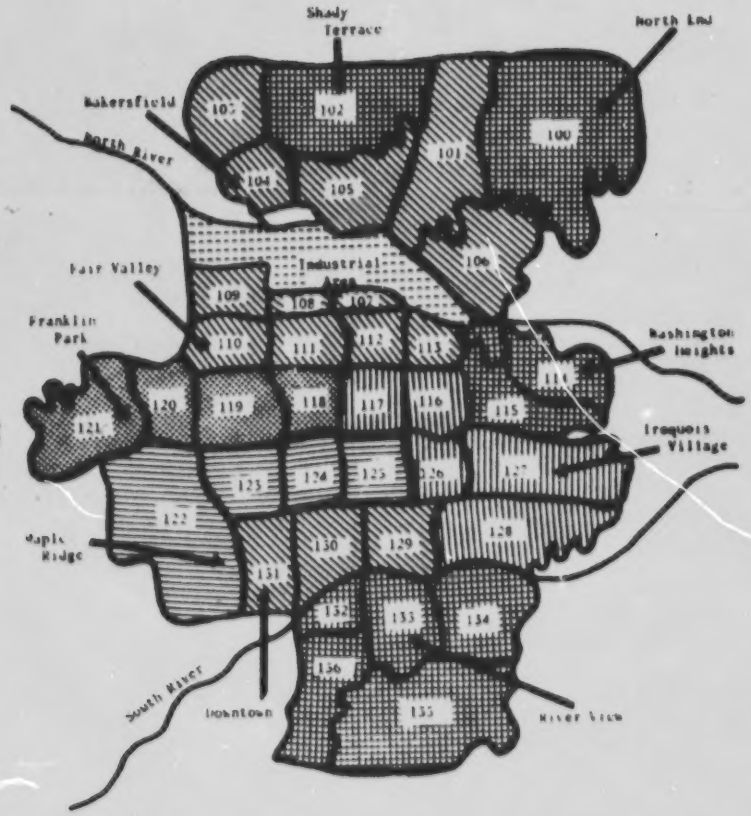


TABLE 2

AGE	TOTAL	NON-WHITE	PERCENT	WHITE	PERCENT
	1970 POPULATION BY AGE				
Under 5 years	14,009	3,781	27.0%	10,228	73.0%
5-11 yrs.	13,743	4,589	33.4%	9,154	66.6%
12-14 yrs.	6,673	2,381	35.7%	4,292	64.3%
15-17 yrs.	6,579	2,233	33.9%	4,346	66.1%
18 yrs. & over	81,590	33,574	41.1%	48,016	58.9%
Total	122,594	46,558	38.0%	76,036	62.0%

TABLE 1

FAIR CITY, U.S.A.

1970 CENSUS, BY CENSUS TRACTS

TRACT NO.	UNDER 5 YRS.			5-11 YRS.			12-14 YRS.			15-17 YRS.			18 AND OVER		
	NON WHITE	WHITE	TOTAL	NON WHITE	WHITE	TOTAL	NON WHITE	WHITE	TOTAL	NON WHITE	WHITE	TOTAL	NON WHITE	WHITE	TOTAL
100	227	14	241	272	10	282	141	8	149	122	12	134	2045	463	2508
101	660	775	1435	932	734	1666	363	247	610	301	315	616	5312	3979	9291
102	276		276	343		343	165		165	170		170	3090		3090
103	24	26	50	39	34	73	7		7	15		15	250	158	408
104	162	195	357	238	185	423	52	84	136	65	82	147	1346	1469	2815
105	268	248	516	310	244	554	169	88	257	162	83	245	2288	1201	3489
106		830	830		700	700		298	298		268	268		2388	2388
107	3	55	58	5	50	55	2	22	24	4	32	36	44	400	444
108	4	83	87	8	71	79	1	45	46	1	51	52	69	570	639
109	3	104	107	4	77	81	1	63	64	1	77	78	36	618	654
110	8	340	348	8	301	309	6	130	136	3	142	145	8	2400	2484
111	11	367	378	15	268	283	6	151	157	5	156	161	131	2630	2777
112	9	331	340	13	288	301	5	138	143	5	155	160	111	2257	2368
113	4	176	180	5	155	160	1	71	72	3	90	93	41	629	670
114	3	249	251	2	278	280	1	179	180	2	153	155	208	2304	2512
115	11	241	252	9	234	243	10	97	107		122	122	83	857	940
116	2	403	405	2	361	363	1	160	161	1	157	158	21	1282	1303
117	14	343	357	15	300	315	8	143	151	8	141	149	134	1145	1279
118	29	280	309	35	228	263	17	131	148	13	125	138	311	1051	1362
119	18	232	250	18	210	228	14	93	107	10	97	107	165	742	907
120	6	357	363	6	305	311	4	156	160	3	147	150	54	1250	1304
121		508	508		451	451		224	224		218	218		1825	1825
122	197	537	734	230	458	688	127	246	373	100	230	330	1059	2969	4028
123	179	196	375	208	168	376	118	90	208	105	93	198	1472	1119	2591
124	61	424	485	68	401	469	43	155	198	38	161	199	610	1240	1850
125	25	449	474	31	409	440	18	179	197	13	180	193	276	1428	1704
126	5	487	492	7	427	434	2	199	201	2	187	189	66	1589	1655
127		418	418		388	388		164	164		147	147		1299	1299
128	1	216	217	2	183	185		105	105	1	89	90	23	838	861
129	122	445	567	154	404	558	68	182	250	60	184	244	1389	1457	2846
130	175	285	460	231	248	479	87	120	207	82	117	199	2082	963	3045
131	322	361	683	362	308	670	229	169	398	200	173	373	2254	2353	4607
132	101		101	120		120	64		64	75		75	1008		1008
133	204		204	205		205	125		125	127		127	1271		1271
134	85		85	90		90	94		94	120		120	1040		1040
135	444		444	459		459	335		335	310		310	3793		3793
136	119		119	143		143	97		97	106		106	1402		1402
Rural Area		253	253		276	276		155	155		162	162	4	3121	3125
Total	3781	10228	14009	4589	9154	13743	2381	4292	6673	2233	4346	6579	33574	48016	81590

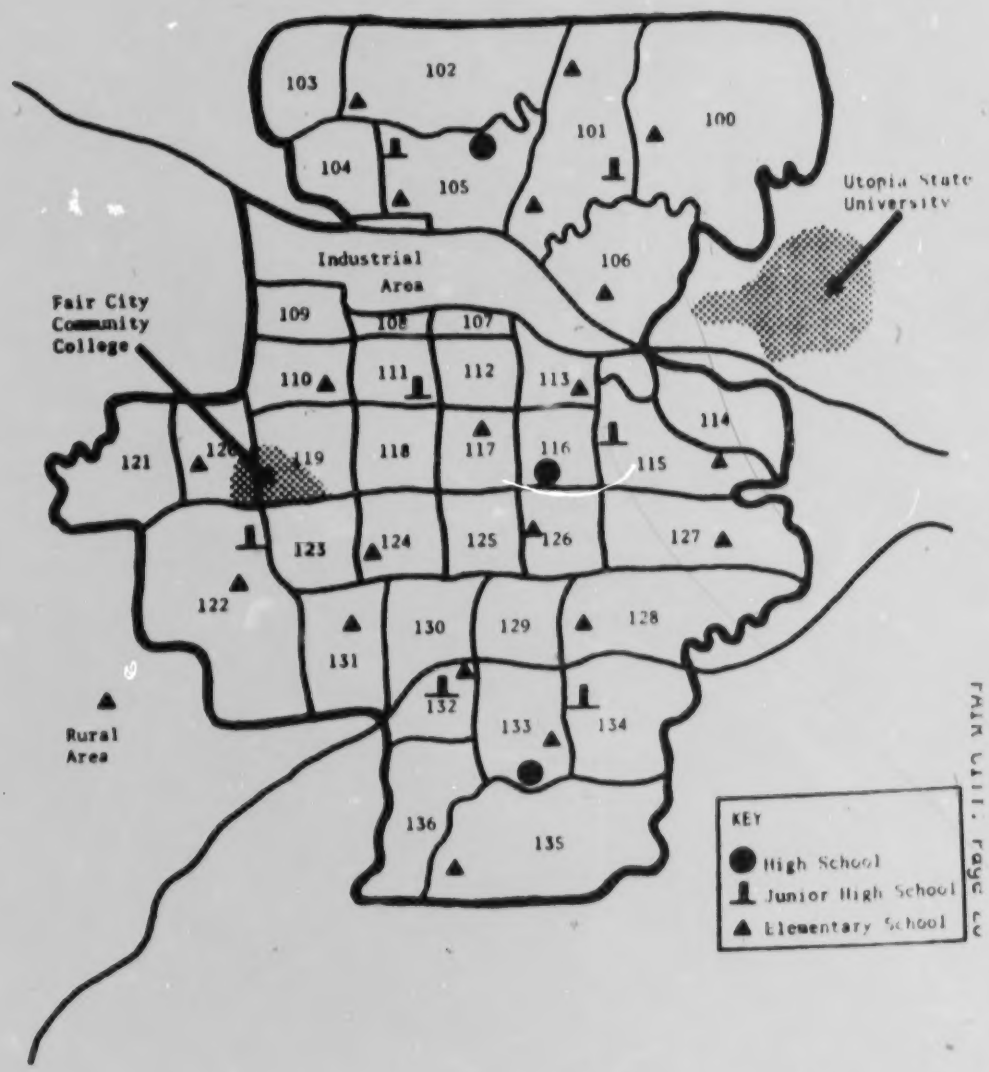
TABLE 3

LOCATION OF SCHOOLS BY CENSUS TRACTS

	LOCATION	ATTENDANCE AREA
HIGH SCHOOLS		
Bridge	105	100-109
Ives	116	110-127, Rural Areas
Banbury	133	128-136
JUNIOR HIGH SCHOOLS		
Margery Daw	101	100-101, 106
Hiram Gordon	105	102-105, 107-109
Elsie Marley	111	110-112, 117-118, 124-125
Polly Flinders	122	119-123, Rural Areas
William McTrimbletoe	115	113-116, 126-127
Robert Barnes	132	130-132, 136
John Watts	134	128-129, 133-135
ELEMENTARY SCHOOLS		
L. J. Horner	100	100 East-Central 101
P. P. Pumpkineater	101	101
Knaveofhearts	101	101
Jackandjill	102	102-104
M. D. Dock	105	105, 108-109
M. Goose	106	106-107
Lamb	110	110-111, 119
L. M. Muffet	113	113, 116
J. Sprat	115	114-115
Calicocat	117	112, 117-118
T. Blindmice	120	120-121
H. D. Diddle	122	122
O. K. Cole	124	123-124
Shaftoe	126	125-126
M. M. Contrary	127	127
Inashoe	128	128-129
S. Simon	131	131
Hubard	132	130-132
Sixpence	133	133-134, 136
B. B. B. Sheep	135	135
L. B. Blue	Rural	Rural

61

MAP INDICATING THE LOCATION OF SCHOOLS IN FAIR CITY



62

TABLE 4

PUBLIC SCHOOL ENROLLMENT BY SCHOOLS, LAST YEAR

	TOTAL	NON-WHITE	PERCENT	WHITE	PERCENT
HIGH SCHOOLS					
Bridge	1554	758	48.8%	796	51.2%
Ives	2756	280	10.2%	2476	89.8%
Banbury	1461	974	66.7%	487	33.3%
JUNIOR HIGH SCHOOLS					
Margery Daw	928	477	51.4%	451	48.6%
Hiram Gordon	621	375	60.4%	246	39.6%
Elsie Marley	1034	249	24.1%	785	75.9%
Polly Flinders	934	97	10.4%	837	89.6%
William McTrimbletoe	723	14	1.9%	709	98.1%
Robert Barnes	687	451	65.6%	236	34.4%
John Watts	792	558	70.5%	234	29.5%
ELEMENTARY SCHOOLS					
L. J. Horner	367	358	97.5%	9	2.5%
P. P. Pumpkineater	808	433	53.6%	375	46.4%
Knaveofhearts	630	365	57.9%	265	42.1%
Jackandjill	786	595	75.7%	191	24.3%
H. D. Dock	651	309	47.5%	342	52.5%
M. Goose	660	5	.8%	655	99.2%
Lamb	719	39	5.4%	680	94.6%
L. M. Muffet	455	5	1.1%	450	98.9%
J. Sprat	457	10	2.2%	447	97.8%
Calicocat	772	60	7.8%	712	92.2%
T. Blindmice	666	6	.9%	660	99.1%
H. D. Diddle	621	221	35.6%	400	64.4%
O. K. Cole	762	265	34.8%	497	65.2%
Shaftoe	766	36	4.7%	730	95.3%
M. M. Contrary	339	0	0%	339	100%
Inashoe	662	150	22.7%	512	77.3%
S. Simon	616	347	56.3%	269	43.7%
Hubard	554	337	60.8%	217	39.2%
Sixpence	420	420	100%	0	0%
B. B. B. Sheep	441	441	100%	0	0%
L. B. Blue	241	0	0%	241	100%

TABLE 5

PUBLIC SCHOOL ENROLLMENT BY LEVEL AND RACE, LAST YEAR					
	TOTAL	NON-WHITE	PERCENT	WHITE	PERCENT
Elementary (K-6)	12,393	4,402	35.5%	7,991	64.5%
Junior High (7-9)	5,719	2,221	38.8%	3,498	61.2%
Senior High (10-12)	5,771	2,012	34.7%	3,759	65.3%
Total	23,883	8,635	36.2%	15,248	63.8%

TABLE 6

PERCENT OF SCHOOL AGE POPULATION ENROLLED IN PUBLIC SCHOOLS: LAST YEAR			
	TOTAL	NON-WHITE	WHITE
Elementary	90.4	96.0%	87.3%
Junior High	89.5	94.6%	81.5%
Senior High	87.8	90.1%	86.5%
Total	89.5	94.2%	86.9%

TABLE 7

ENROLLMENTS BY SENIOR HIGH SCHOOL DISTRICTS: LAST YEAR				
HIGH SCHOOL AREA	K-6	7-9	10-12	TOTAL
Bridge	3,902	1,549	1,554	7,005
Ives	5,798	2,691	2,756	11,245
Banbury	2,693	1,479	1,461	5,633
	12,393	5,719	5,771	23,883

TABLE 8

STUDENT-TEACHER RATIO			
SCHOOL TYPE	STUDENTS	TEACHERS	RATIO
Elementary	12,393	413	30
Junior High	5,719	204	28
Senior High	5,771	222	26
Total	23,883	839	28.5

TABLE 9

STATISTICS ON CLASSROOM TEACHERS			
	NUMBER	PERCENT	NATIONAL AVERAGE
Full-Time Classroon Teachers	839		
Level of Preparation			
No Degree	143	17.0%	7.0
B. A.	571	68.0%	69.6
M. A.	117	14.0%	21.9
M. A. + 30	***	***	1.3
Doctorate	8	1.0%	.1
Teacher Turnover By Class			
Resignations	112	13.4%	7.7%
Other (Death, Promotion, Retirement)	43	5.1%	3.0%
Total	155	18.5%	10.7%

***Included with M.A.'s

TABLE 10

SCHOOL SYSTEM STAFF		
Professional Staff		969
Superintendent	1	
Assistant Superintendents	3	
Administrative Assistants	2	
Directors	4	
Principals	31	
Assistant Principals	27	
Teachers	839	
Elementary Teachers (413)		
Jr. High Teachers (204)		
Sr. High Teachers (222)		
Librarians	12	
Counselors	35	
Psychological Staff	9	
Other	6	
Non-Professional Staff		89
Teacher Aids	47	
Other	42	
Total Staff		1058

TABLE 11

POPULATION DISTRIBUTION BY RACE: 1950-1970					
YEAR	TOTAL	NON-WHITE	PERCENT	WHITE	PERCENT
1970	122,594	46,558	38.0%	76,036	62.0%
1960	112,237	35,018	31.2%	77,219	68.8%
1950	71,100	14,431	20.3%	56,669	79.7%

TABLE 12

ECONOMIC CHARACTERISTICS OF THE POPULATION: 1970	
Total Personal Income	$287,775,576
Per Capita Personal Income	2,348
Per Capita Effective Buying Income	2,008
Household Income (Average)	6,943
Household Effective Buying Income	5,775
Per Capita Total Local Taxes	143
Per Capita Taxes as Percent of Per Capita Income	6.1%
Percent of Unemployment	6.5%

TABLE 13

POPULATION MOBILITY: 1960 TO 1970						
	TOTAL	PERCENT	NON-WHITE	PERCENT	WHITE	PERCENT
Persons 5 yrs. & older	108,585	(100)	42,777	(100)	65,808	(100)
Reside in same house since 1960	56,463	52%	18,822	44%	40,143	61%
Moved since 1960	52,122	48%	23,955	56%	25,665	39%
Moved within city	39,091	36%	14,972	35%	17,768	27%
Moved to city from outside	13,031	12%	8,983	21%	7,897	12%

GAME MANAGER'S MANUAL: SECTION II

CHAPTER III

FEHR-PRACTICUM

Players' Instructions

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4215A SCHOOL OF EDUCATION BUILDING
UNIVERSITY OF MICHIGAN

This preface does not appear in the Players' Instructions booklet used by the teams. In addition, because of the complex nature of some of the instructions, it was necessary to interleave explanatory notes to the Game Manager throughout the booklet. To clearly differentiate the notes from instructions, they are placed on facing pages. Beginning overleaf, a page from the Players' Instructions booklet will appear on each right-hand page and the corresponding Game Manager's notes on the left-hand facing page. For additional clarity, appropriate titles are placed at the top of each page.

Preparing for a Session

The players' instructions provide step-by-step directions for completing the work assigned in the practicum. At each step, various optional tasks (assignments) of varying difficulty and complexity are provided. The Game Manager's major preparation task is to choose the set of tasks to be assigned for the session at hand. In the Game Manager's notes we will point out the options and provide some general guidelines for choosing among them. However, the Game Manager must decide which options best suit his/her particular combination of instructional objectives, trainee entry skills, and available local resources.

It is essential that the Game Manager become thoroughly familiar with the players' tasks at each step of the practicum before attempting to choose among the optional assignments. Since both the conceptual difficulty and the time required for the various tasks changes radically from problem to problem, the only safe procedure is for the Game Manager to walk-through the entire practicum step-by-step with each problem (RFP document) which is to be used. It is highly desirable, but perhaps not essential, that all consultants have direct experience with the particular problem or problems being used. Section III provides specific directions for a walk-through orientation to the standard REMAR problem. Section IV provides suggestions for adapting the orientation to the other seven problems.

There are, of course, a number of preparatory activities related to the choice of research consultants, arrangements for suitable physical facilities, and acquiring ample FEHR materials and auxiliary references. A detailed discussion of these matters appears in section III.

The First Meeting

The Players' Instructions begin with the assumption that each prospective player (trainee) has read the introductory materials presented in Sections I and II of this manual. It is suggested that these materials be passed (or mailed) to each player, at least one day prior to the first formal practicum meeting, as a formal reading assignment. At the first formal meeting, it is suggested that the Game Manager might proceed as follows:

(1) Provide a brief overview of the goals of the practicum session and a general description of the activities in which players will participate

(2) Briefly review the nature of FEHR-PRACTICUM using the chart on page 4 of the Players' Introduction to FEHR-PRACTICUM (Section I of the manual) as a guide.

(3) Pass out the RFP document to be used during the session.

(4) Read the first two pages of the RFP aloud to the class.

(5) Point out the list of tasks on pages 2-5, say that these will be discussed fully next day.

(6) Discuss briefly the contents and use of each appendix. It is suggested that you:

(a) Display the Information Bank and explain how to use it.

(b) Illustrate the use of the Research Population in Appendix II.

(c) Briefly discuss Appendix III pointing out the various treatment costs, emphasizing the nature of the time units, and the bottom of the page without detailed explanation. Explain how to read the catalog charts.

(d) Discuss the Catalog of Variables in some detail. Read aloud the notes on page 1, and point out the costs listed at the bottom of the page without detailed explanation. Explain how to read the catalog charts.

(e) Read aloud those sections of the remaining appendices which you judge to be relevant to the completion of the Orientation Questionnaire.

(f) Pass out the Players' Instructions booklet and assign Task 1, next page. The remainder of these notes are synchronized with the instructions and the corresponding items on the Checklist of Tasks to be Performed from pages 3-6 of the RFP document.

TASK 1 Orientation Questionnaire. Much of the advantage of the FEHR system derives from the personal involvement of each player in "solving" the problem. It is important to establish this involvement very early in a session. Consequently, we recommend that each individual player be required to complete an Orientation Questionnaire prior to the formation of teams. For this reason, item one on the Checklists of Tasks (see page 3 of the RFP document for the problem concerned) is marked with an asterisk.

It is suggested that the Game Manager:

(1) Read aloud the instructions for Task 1.

(2) Briefly discuss the contents of the Orientation Questionnaire.

(3) Require each player to complete the Orientation Questionnaire independently. We suggest that players be supplied with an extra copy of the questionnaire rather than completing the one in their Instructions booklet. (Extra copies can be ordered separately.)

(4) Try to encourage players to answer all items thoughtfully and completely without making the task appear prohibitively difficult. It is neither necessary nor desirable for players to "bone up" on the literature (Information Bank) or research methodology before answering the questionnaire -- its sole purpose is to motivate careful analytical reflection at the player's present level of expertise.

(5) The questionnaire might be finished during the first meeting, if time permits, or assigned as "homework". In either case, remember to allow time for reading the questionnaires before forming teams.

(6) Before dismissing the first meeting, it is a good idea to preview the contents of task 2 so that players will know what to expect. In fact, players should be encouraged to read through all the instructions.

TASK 2 Organization and Assignments. This task would normally be completed during the second meeting. Two things must be accomplished. (1) the players must be organized into teams, and (2) the tasks to be completed during this particular session must be assigned. The assigned tasks should be checked off in each players checklist (page 3-5 of the RFP). This may be done at the second meeting, or, to save time, each list can be checked off prior to being distributed. Use the Game Manager's notes associated with each of the tasks to help you decide whether or not to assign the task and to decide among options within each task.

The options within task 2 involve salary and costs, the method of requesting information from the data generator, and a log of activities. Some comments and suggestions:

(continued on page 75)

INSTRUCTIONS

The intent of this package is to provide detailed instructions on how to fulfill the tasks which have been assigned to your team. At this point you should be familiar with the background information contained in the Player's Introduction to FEHR-PRACTICUM, and Fair City, U.S.A., and have read the first two pages of your Request for Proposal and scanned the Appendices. These instructions correspond to the list of tasks (pages 3-6) in the RFP. It might be helpful to remember that these tasks are somewhat progressive so that you may find that the later tasks are mere elaborations and extensions of some of the earlier tasks.

Task 1: Orientation Questionnaire

This questionnaire, which appears on the following page, is intended to guide you to those aspects of the game which you should be considering. The responses which you give will not be used to evaluate you, although the game manager may use them to form effective teams. Please make your responses as concise and specific as possible; the length of each should be determined by the space allotted to it on the questionnaire form. Your game manager will tell you whether you are to use the copy in this booklet, or if he/she will provide an extra copy for you to use.

Task 2: Organization and Assignments

At this time the game manager will give directions on forming teams. He will also inform you what the team salary is for your particular research, and will explain how the simulated costs will be handled. Further, he will give instructions on how to use the computer.

The tangible work which you or your team must produce is determined by the specific tasks which the game manager has chosen and these should be checked off on the list of tasks contained in the problem description. These tasks will be described more fully as is appropriate. However, the game manager should give you a fairly clear schedule of events at this time.

One of the tasks you may be asked to perform is to keep a log. Research in education, like an experiment in chemistry, must be carefully recorded in order to account as well as possible for all influences on the experiment or research. Consequently, it is useful to the researcher and interested parties to keep a log containing every relevant detail of procedure and process as a precise history of the research. It is likely that in the latter stages of your research you will wonder why you took various courses of action. Therefore, even if a log is not a requirement, it is a highly recommended course to follow.

Entries into the log should be brief and need not be made for every work session. The type of information which you might include in the log would be: determination of a research strategy, and any changes in this strategy; use of the computer for generation of FEHR data and for data analysis; and use of FEHR resources (consultants, I.S.T. units, references, and Information Bank).

(1) Team salary is applicable whenever costs are used. It has proven to be a very useful device to motivate teams to plan their activities and budget their time thoughtfully. However, the salary item must be a significant portion of the total budget to be effective, therefore different salaries should be used with each problem. Suggested levels for each problem are given in Appendix I. Higher rates than those suggested may be used if it seems desirable to increase the emphasis on completing tasks as scheduled. Emphasize that salary is paid on real time and not on simulated FEHR time. Note, too, that the same salary is used for all teams even though they are of different sizes.

(2) In our field tests, costs have proven very useful in creating a "real-life" atmosphere. We recommend that they be used if time permits. However, if there is insufficient time to calculate research budgets, costs may be ignored.

(3) The normal method of paying for FEHR costs is by checks (option b). However, if your computer installation has sufficient disk space available, it may be possible to adapt the FEHR automatic accounting program used at Michigan to your system. However, this program necessarily depends on a variety of system routines which differ from installation to installation. You would require a systems programmer at your installation to do the actual adaptation. Further information is available from the authors on request.

(4) Keeping a log is a relatively easy task which supplies a great deal of useful evaluative information. If individual performance is to be assessed, each player should keep a log. Otherwise, one log may be kept for each team.

ORIENTATION QUESTIONNAIRE

1. What observed problem prompted the sponsor to put out a request for proposals?

2. What would convince the sponsor the problem has been solved?

3. What modification of the sponsors' view, if any, would you make? What argument would you use to convince the sponsors to alter their views?

4. Considering all the views above, define the research problem as you see it.

5. In making an experimental comparison, what classes of variables would you use to measure the effectiveness of the various treatments (programs) available in this problem, i.e., IQ, achievement, perceptual, personality, etc.?

6. Assuming you could not use more than a total of 100 subjects in the treatments, how would you go about selecting this group from the total available research population?

7. Briefly describe how you would divide this group of 100 into the available treatments.

8. Briefly describe the possible techniques you might use to analyze the data collected after the treatments have been administered.

9. How does this problem's content area relate to your educational interests?

10. Briefly describe what past experiences you have had with research.

TASK 3 Operationalizing the Problem. On first reading, part A of this task may appear deceptively simple. Since each player was required to define the problem informally in the Orientation Questionnaire, it appears that a brief discussion is all that is required to produce consensus. It is our experience, however, that substantive differences in team members' views almost always appear when the team begins to select the specific dependent variables to be used and set the criterion levels which indicate successful achievement. Such conflicts provide a powerful motivation for a critical review of the research and an intensive study of measurement theory as it relates to the particular tests available. In sessions emphasizing problem-definition skills, we recommend "seeding" the teams to ensure a variety of viewpoints. For example, each team might contain an administrator, a researcher, and a teacher-educator (hopefully of clinical orientation).

The Checklist of tasks provides optional assignments with respect to both the amount of background reading (review of the literature) and the problem definition per se. Comments and suggestions:

(1) If the players have a substantive interest in the content area of the problem, they should probably be asked to review the original articles in their entirety rather than just the Information Bank summaries. In this case the Bank summaries provide a useful role in determining which studies might safely be ignored. It has been our experience that team members interested in the area frequently do fairly extensive library searches even when they are not assigned. The "Information Bank only" option would normally be assigned if the content area of the problem was not of direct interest to the players.

(2) If there are stringent time constraints or if the session is to be devoted to research design/data analysis, it may be desirable for the Game Manager to provide an operational statement of the problem. It is our experience, however, that most clients are extremely weak in problem-definition skills. We recommend student participation in problem definition wherever possible.

(3) The problem definition form is intended to push players beyond the simplistic immediate problem stated in the RFP to the basic problem (or root problem) which the programs being evaluated are attempting to address. Specific notes are provided for each problem area in Section IV.

Task 3: Operationalizing the Problem

After you have formed into teams, you should work toward conceptualizing the problem. Remember that the preliminary parts of research involve a continuing process of clarification, re-evaluation, and integration of new facts.

The following items are intended to help you clarify your thinking about this problem:

A. When your team first gets together, compare and contrast your individual problem definitions, based upon the Orientation Questionnaire. You should try to reach a problem definition you can all agree upon.

B. Review the literature on the content area and reconsider the problem definition as seems appropriate.

C. Formal problem definition: Based on your collective views and the literature, you are to arrive at a definition of the problem. The process by which you may arrive at this definition is illustrated by the chart on the next page. The following instructions will assist you in completing each section of the sheet. Your game manager will indicate whether you are to use the form in the booklet or obtain another copy from him.

1. A problem may be defined by the discrepancy between what should be and what is happening.

   (a) What should be happening, but is not? This may be stated in terms of the sponsor's objectives and your own.

   (b) What is happening that should not?

2. Do you believe your views are different from the sponsor's views? If so, how? How will you handle this difference if there is one?

3. Consider the available treatments carefully. This section of the chart is intended to help you delineate the differences between the treatments. Is there any discrepancy between the problem definition you have and the kind of things these treatments are intended to do? If so, re-evaluate.

4. What kind of information would you like to have about your subjects? Two of the major categories of variables are independent and dependent variables. Dependent variables are those which can be influenced by treatments. Independent variables are those which influence the effects of a treatment. Independent variables can be broken down into two types: manipulable and nonmanipulable. The nonmanipulable variables are those which the researcher can not change; for example, sex. Manipulable variables are those external factors such as the kind of school which the researcher can have some effect upon. It is possible that one variable can be both dependent and independent. For example, if you select a student on the basis of IQ, you can also measure the effect of the treatment by determining how much the IQ scores have changed. You should determine what are the independent and dependent variables which you would like to use.

PROBLEM DEFINITION FORM

1. (a) What should be happening?	(b) What is happening?

2. Difference in Views

3. Treatments	Desirable Consequences	Undesirable Consequences

4. Independent Variables		Dependent Variables
Manipulable	Non-Manipulable	Change

TASK 4 Determining the Extent and Severity of the Problem. If there are severe time constraints in a session, Task 4 may be skipped in its entirety. In that case, the Game Manager would normally supply the teams with both a problem definition (Task 3) and the proportions of subjects affected at various levels of severity (according to the definition) in each unit and subunits (e.g., schools and classrooms) to be used. If this procedure is adoped, the Game Manager must obtain the required information by running survey using his problem definition prior to the practicum session.

A useful alternative to supplying the extent and severity information is to gather the information collectively with all teams completing task 4 as a single group. This has the additional advantage of familiarizing players with the procedures for requesting information from the data generator. However, if time permits, we recommend that each team be required to design and run its own file searches and/or surveys. If a practical demonstration of a file search/survey seems desirable, a sample request using a few randomly selected subjects and a variety of (perhaps irrelevant) variables. The validation request listed in Appendix I, (or a modification thereof) may be used for this purpose.

The comments and suggestions for each sub-task are listed below:

Sub-task 4.1 Submit a Request for a Planning Grant.

(1) If time is constrained, the budget aspects of task 4 may be ignored. (However, see comment 3, below).

(2) The suggested maximum grant for each problem appears in Appendix I.

(3) We have found that the needs of the teams varies so greatly that a maximum grant is of limited value in determining the level which should be alloted to any one team -- many teams can and should get far less than the maximum. We recommend that awards be negotiated at a meeting of the team and the Game Manager (or his designate). The team should be prepared to justify each item on the budget. Most teams in our filled studies have considered this negotiation experience invaluable.

5. Next, go to the Catalog of Variables and select the variables which you think important. You will notice there is often a duplication of tests measuring the same thing. Look at the prices listed and the descriptions presented in the Information Bank. To help you choose among tests compare the prices, reliabilities, and test validity scores. You might also discover that some variables which you think are important are not available; consequently, you might have to alter your problem definition somewhat.

   If at this point you or your team remains confused about what is involved in defining the problem, you should hire a consultant. If you have any questions concerning the use of FEHR resources, or other technical details, consult your game manager.

Task 4: Determining the Extent and Severity of the Problem

The information you have been working with so far is based on research reported in the literature and your own logical analysis of the problem. At this stage you may wish to obtain more precise information about the status of the particular research subjects available in your problem by obtaining the scores of a representative sample of subjects on the variables (tests) which were identified in Task 3. This can be accomplished by running a File Search or Survey or both.

There are three main sub tasks within Task 4. These are described below as Tasks 4.1 to 4.3.

Task 4.1: Request for a Planning Grant

If you are responsible for budgeting funds, it will be necessary to obtain a planning grant before proceeding with your file search and/or survey. The first step in this process is to fill out a Request for a Planning Grant form. A copy of the request form appears on the following page. Your Game Manager will tell you whether you are to use the copy in this book, or if he/she will provide an extra copy for you to use.

The first five items on the form can be filled out by summarizing in a few succinct sentences the information from your Problem Definition Form (Task 3). The IST Unit on sampling may be of help in completing item 5.

Item 6 requests a plan for analyzing your data if your team consists entirely of research novices. You may have to do some independent study before completing this item. Your Game Manager will provide a list of the independent study materials which are available to you.

Item 7 requests a brief itemized budget. All the information necessary for preparing the budget is given in Appendix IV of your RFP, the Catalog of Variables. Pay particular attention to the general costs given on page 1 of this appendix. The overhead cost for initiating

Sub-task 4.2 Running a file search or survey.

(1) Make sure the players understand the difference between file searches and surveys (see page 10, Players' Introduction) and the cost of each (see instructions pages 5 and 7).

(2) The maximum number of variables which can be printed by the computer on any one file search, surveyed or treatment is 20.

(3) The use of restrictions on both subjects and variables is encouraged. In most problems about 120 subjects will give ample statistical power, and their selection will provide trainees with vital experience in sampling. In no case should a student be allowed to survey the whole population -- it is too expensive in terms of computer time as well as being experimentally inefficient. In the case of variable restrictions there are two considerations. First, a team ought to be aware that several tests must be used to measure the degree to which objectives are being met. Second, no team should be permitted to define the problem in too-simplistic terms. They should be encouraged to use designs which stretch their technological expertise.

(4) Additional comments appear opposite pages 14-18 of the instructions which describe the procedure for preparing a request to the data generator.

Sub-task 4.3 Analyze the Data from Step 4.2.

(1) Describe the facilities available at your local computer center and the procedures for using them.

(2) The general assignment of files or punch cards in Task 2 should be made on the basis of the facilities available.

(3) Time and budget allotments must allow for local turn around time.

(4) The complexity of research design may be limited by the analytic programs available locally. (However, see IST units I and II).

(5) Most canned data analysis programs require the preparation of a format card. Instructions in preparing format cards for FEHR data are given in IST unit III.

Sub-task 4.4 Formal Problem Description (first draft).

(1) It is a good idea to require a written problem description whenever a proposal has been assigned.

(2) In our experience, the critiquing of each team's problem des-

FEHR-PRACTICUM

REQUEST FOR A PLANNING GRANT
TO SUPPORT A FILE SEARCH AND/OR SURVEY

Team _____ Date _____ Amount Requested _____ Approved by _____ (Game Manager)

1. State the problem in operational terms.

2. Briefly explain how you plan to use the requested funds and what you hope to find.

3. List the variables (tests) which you are going to measure.

4. How did you choose the particular variables listed above?

5. How many research subjects do you plan to use, and how will they be selected?

6. How do you plan to analyze the data?

7. Itemize the FEHR-PRACTICUM costs of this planning project.

cription by the total group usually results in numerous constructive criticisms of each team's work. We recommend this procedure wherever possible.

(3) Although a consensus definition is not a necessary good of the critique meeting, it is a frequent result. When consensus occurs, it may be desirable to conserve computer funds by completing task 5 as a cooperative large-group endeavor. If a comparison of experimental quality is to be made in task 7, it is desirable to get agreement on the dependent variables to be used and the relative importance of each (see IST unit I).

(4) For sessions concentrating on problem description this is the final task. In this case it may be desirable to expand the contents of the description to include more details about the survey and its results.

TASK 5 Identifying a Pool of Research Subjects for Treatments

(1) If all subjects "eligible" for the treatment have similar characteristics, it is convenient to use the FEHR secretary. See IST unit V for instructions.

(2) The secretary is not an efficient way to do stratified random sampling. It is better to run a survey to obtain the score values for all subjects on the stratifying variable(s), then sort the subject-cards (or file lines) using the system services supplied at your computer installation.

(3) If task 5 is assigned, great care must be taken to ensure that the selection criteria are not too stringent to provide ample research subjects. When the FEHR secretary is to be used, it is a good practice to insist that a team must be able to demonstrate from survey results that they will get the required number of subjects before allowing them to proceed. If an ordinary survey is used, the selection criteria can be modified after the fact without engendering additional computer costs.

(4) It is usually advisable to suggest that the surveys be conducted on intact units or sub-units (chosen either systematically or randomly) -- surveying the entire research population is almost always prohibitively expensive.

TASK 6 Empirical Evaluation of the Educational Treatments. Comments and suggestions are grouped within sub-tasks.

Sub-task 6.1 Proposal

(1) If task 4.4 (Formal problem description) was assigned, point out that the proposal is just an expansion of that material.

(2) The proposed maximum budget is given in Appendix I.

(3) Again it is recommended that different levels of funding be a-

a file search or survey is intended to simulate the cost of setting up. A change is made for each separate computer run.

The overhead for entering a unit or a sub-unit is intended to simulate costs of interrupting an educational unit (e.g., school) or sub-unit (e.g., class). This charge is made for each separate interruption. If, for example, you chose 10 students from class 1, then 10 students from class 2, then an additional 5 students from class 1, you would be charged three sub-unit overhead costs: two for class 1 and one for class 2.

The cost of variables are given on a per score basis. The price of file search information is always five cents per score. However, the cost of each survey score depends upon which test is used: these costs are listed on the Catalog of Variables.

Include a salary item based on your best estimate of the length of time it will take to complete the task.

Task 4.2: Running a File Search or Survey

To obtain your file search or survey data, you must prepare a request for the FEHR data generator. Complete instructions are given in Appendix III of these instructions.

Task 4.3: Analyzing Your Data

Once the data from Task 4.2 are obtained, you may proceed with the analysis. Your Game Manager will explain the local facilities.

Task 4.4: Prepare a Formal Problem Description. (first draft).

A formal problem description is always contained in a research proposal. The contents expected here are described in sections B, C, and D under the proposal (Task 6.1). Be prepared to present your Description for critical discussion by members of the other teams at the time indicated on your Checklist (page 4). If the criticisms warrant it, revise your description before proceeding.

Taks 5: Identifying a Pool of Research Subjects for Treatments

In some problems it is advantageous to run a second survey and/or file search to identify a set of subjects who are "eligible" for the educational treatments to be evaluated. For example, a remedial program would probably be aimed at a small sub-set of students who were having specific problems. Complete this task by following the steps outlined for Task 4.

Task 6: Empirical Evaluation of the Educational Treatment(s)

Task 6 is the major activity of FEHR-PRACTICUM. It consists of four sequential tasks, with each task in itself constituting a complex process. The four tasks are described below as Tasks 6.1 to 6.4.

Task 6.1: Proposal

Submit a research proposal on the date indicated and negotiate the level of funding with the Game Manager. The proposal title and the authors names should appear on the first page. A table of contents should follow the abstract for longer proposals. For more detailed instructions, see the recommended references on page 10.

warded to each team. The team should be required to justify each item in their budget.

(4) Underbudgeting is, in our experience, a more frequent error than overbudgeting.

(5) The choice of writing style should be made on the basis of the time available and the needs of the players. When time is constrained, we recommend a brief outline proposal rather than requiring no proposal for two reasons: first, we have found that the quality of planning increases significantly when the plans must be specified in written form, and, second, the proposal provides a written record of a team's accomplishment. (The same arguments would, of course, apply to the final report.)

Sub-task 6.2 Running the experiment in the FEHR data generator.

(1) See the comments opposite the instructions for running a treatment in the data generator (pages 18 & 1a).

(2) The choice of data output depends on your local computer installation. The "printed copy only" option would be used if statistical analysis was to be done by hand. The type of copy is controlled by the first control card in a request to the data generator, see the Game Manager's notes oppostie page 14 of the Instructions.

A. Abstract--This should be an objective, accurate, clear summary of the essential information contained in the proposal, including objectives or nature of the project, a practical justification for this research, and procedures to be used.

B. Introduction and Overview of the Problem--This should include a statement of the problem or purposes in terms of background information pertaining both to this school system and other research in this field.

C. Review of Related Literature--Some indication should be given of how the proposed research will extend, refine or revise existing knowledge. A briefly annotated bibliography should be included.

D. Statement of the Problem in Operational Terms--This should be in the form of a hypothesis concerning the relevant variables, the relationship between them, and the target population.

E. Procedures--This section should describe the steps to be used in testing the hypothesis, including sampling methods, research design and rationale, treatments to be administered, variables to be considered, data collection, and data analysis procedures.

F. Schedule of Activities--This should indicate the steps by which you will progress through the above procedures, as well as the use of the Information Bank, IST units, and any other research which you plan to do. A flow chart may be used.

G. Budget--Your budget should state exactly how much money you are requesting, and specify how these funds are to be spent. These costs should agree with the procedures which you outlined above, although you should allow for unplanned expenses. The areas which should be included are: term (time), salary of team, consultant fees, file search and survey costs, and contingency funds. This must be carefully itemized.

Task 6.2: Collect the Data

After dividing your total sample into treatment groups, run your experiment via the FEHR Data Generator. See Appendix III and/or your Game Manager for instructions on how to enter your request and obtain your results.

"Research may be one path to many destinations or many paths to one destination"--FPS

Sub-task 6.3 Analyze and interpret the data (from 6.2)

(1) See comments for sub-task 4.3.

Sub-task 6.4 Submit a final report

(1) Teams will probably need help in deciding on the report format -- especially tabular material. A good reference should be available. (For suggestions see the comments opposite the list of references on pages 10 - 13 of the Instructions).

TASK 7 Attend a Consolidation Session

(1) The meeting should be attended by all teams participating in the consultants. If more than one problem (RFP) was used, a separate consolidation session should be scheduled for each problem area.

(2) It is advantageous to have copies of the reports distributed in advance of the meeting. A less desirable alternative is to have each team make a verbal report at the meeting. The latter, of course, requires much more time.

(3) The effectiveness of each decision should be assessed by running the FEHR Decision subroutine. Instructions for running this program appear on page of this manual.

(4) Each team's report should be critiqued by the Game Manager and/or the consultants -- preferably in writing. Wherever possible, the criticisms should be related to the Decision outcomes above.

(5) At the critique session, each team report and the associated critique should be presented, followed by a general discussion of the merits and demerits of the various reports.

Task 6.3: Analyze the Data

Your Game Manager can inform you about the facilities, canned programs, data manipulation procedures, and types of output available to you. You should be able to distinguish between the statistical conclusions of your analysis and the educational implications of those findings, and are urged to keep these conclusions entirely separate.

Task 6.4: Prepare a Final Report

The final report should contain your proposal and all items checked off on the list of tasks. It is in this report that your team describes what you discovered and what you think it means and draw your conclusions. This is, in effect, where you put all your work together, where it culminates, so make the best of it.

Task 7: Attend the Consolidation Session

At this meeting you will obtain feedback on the results of using your recommended decision for an entire year, and have an opportunity to discuss the results. In addition, you will be given constructive criticism on your final report.

Research Consultants

(1) The persons chosen as research consultants can have a crucial effect on the amount learned by the player-trainees. In a research-training institution we recommend the use of advanced students for consultive purposes. The advanced students can then consult with a single expert (the professor) for especially difficult problems. In many settings institutional credit can be arranged as (real life) "payment" for the consultants. In our experience the consultive role has proved to be a rich and rewarding learning experience for the consultants themselves. This procedure has the additional advantage of providing a high level of individualized instruction to player-trainees at a low cost.

(2) We have had some negative experiences with the requirement that consultants be included in each team's FEHR budget. Teams were loathe to spend money (even FEHR money) on student consultants. To avoid this difficulty, we regularly awarded a special FEHR grant (via the Message Generator) which could be spent only to hire consultants.

(3) For your convenience, a special from for obtaining Vita information of FEHR research consultants is provided in the back of this manual. Copies of the vita information would normally be presented to each team with the problem (RFP) packages.

I.S.T. Units and References

(1) The materials included under the reference title on page 10 are available in paperback, individually bound versions. In our field trails, these were used as I.S.T. units with considerable success: Player-trainees found the booklets on the proposal, the report and simplified designs expecially helpful. However, they are listed separately because they are not part of the FEHR project per se.

(2) We recommend that a wide variety of research references be made available to the player-trainees during the session. The references listed on pages 12 and 13 of the Players Instructions would be suitable for IST purposes.

(3) In our initial FEHR writings, Information Bank materials and IST units were budgeted items with per-item costs attached. This was abandoned when a per diem (real time) team salary was adopted. The rationale was that any time spent using these materials would now be charged through the (real-time) salary.

APPENDIX I
FEHR RESOURCES

RESEARCH CONSULTANTS

The research consultants in the FEHR-PRACTICUM game serve the same function as they would in real-life research. You may hire a consultant to advise you whenever you are uncertain about some aspect of your research methodology.

Each consultant's fee and schedule are located in the upper right-hand corner of his vita. To hire a research consultant, you must enter your request on the "Consultant Waiting List" through the game manager. Since a number of teams may be playing a FEHR game at the same time, consultants will be made available to each team on a first-come-first-serve basis.

I.S.T. UNITS

In real life, a researcher may need extra training to enhance his knowledge in areas relevant to his research. Therefore, he might opt to take courses at a nearby university. In the FEHR-PRACTICUM game, such "courses" are called IST units. The In-Service Training unit consists of instructional materials which provide training in research skills especially relevant to FEHR-PRACTICUM. The particular "courses" which are available in any one game are listed below. To obtain an IST unit, please submit a verbal request to the game manager.

Number	Title of Unit
I	Assessing Success for Complex Objectives
II	Criterion-Referenced or Mastery Testing
III	Computer Format Statements for FEHR Data
IV	Sampling the Subjects to be Studied
V	Using the FEHR Secretary

REFERENCES

In addition to the topics covered by the FEHR-PRACTICUM I.S.T. Units listed above, there may be other research skills with which you need assistance. The following set of programmed instructional materials is recommended as a means by which you may achieve a greater degree of competency in those skills. These materials were developed by the Southwest Regional Laboratory for Educational Research and Development, and are available from the American Book Company.

Educational Criterion Measures by W. James Popham
(C7858-000-5)

Selecting Variables for Educational Research by Paul E. Resta, Robert L. Baker
(C7864-000-8)

Components of the Educational Research Proposal by Paul E. Resta, Robert L. Baker
(C7865-000-3)

Classifying and Interpreting Educational Research Studies by Howard J. Sullivan
(C7863-000-2)

Simplified Designs for School Research by W. James Popham
(C7867-000-4)

Choosing an Appropriate Statistical Procedure by Richard M. Wolf
(C7868-000-X)

The Use of Library Computer Programs for Statistical Analyses by Richard M. Wolf
(C7869-000-5)

The Research Report by Paul E. Resta
(C7870-000-0)

APPENDIX II

AUXILIARY REFERENCES

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APPENDIX III

INSTRUCTIONS FOR OBTAINING INFORMATION FROM THE FEHR DATA GENERATOR

It is useful to begin with a definition of the terms used in the instructions, especially since many of them have rather special meanings in the FEHR-PRACTICUM. A glossary of terms appears below.

File Search: A file search refers to a subject's score on a particular test (or variable) administered some time in the past. Therefore, a file search will return exactly the same score for a particular individual each time it is used. Since no actual testing is involved, file searches are much cheaper than surveys. However, only those variables which have 'YES' in the FILE column can be obtained via a file search.

Survey: A survey refers to information collected by the administration of a test or tests at the present time; that is, at time zero in the game. (See Appendices III and IV of your RFP package for a definition of time zero.) Each time a survey is conducted the test(s) are re-administered. Individuals will get somewhat different scores each time because of errors of measurement. The costs of a survey score on one person is tabulated in Appendix IV of your RFP.

Treatment: A treatment in FEHR refers to the program which administers a particular treatment. Tests can be administered at any time during a treatment up to the maximum time available in your problem. The meaning of time zero, the size of a unit of time (e.g., weeks, months, years), and the maximum time available are all specified in Appendices III and IV of your RFP.

Treatment Group: A treatment group is a set of subjects who receive exactly the same treatment and tests. Note that it may contain several "groups" from your research design. For example, if sex and race were design factors, males and females of all races could be included in the same treatment group. This would be advantageous in cases where it costs more to administer the treatment to four small groups than to a single large one.

Card: A card refers to a single line of instructions for the computer such as might be printed on a single punch card. Such an instruction usually contains letters, words, and/or numbers which must be in particular positions in the line. Each card has only a limited number of positions: the maximum number of characters--including letters, numbers, and blanks (or spaces)--on any one card is 80. Cards must be entered to a computer in a specific order which is prescribed by the instructions which follow.

Line: A line refers to a position on a private computer file. This can be thought of as successive lines on a printed page. A line in a file is an exact counterpart of a card. Again, the lines must appear in the order specified by the instructions.

Column: A column refers to the position from left to right on a card or line. The first position is column 1, the second column 2, and so on.

Columns are exactly equivalent to spaces on a typewriter. Each column may contain any legal typewriter character--including a blank. Note that a blank is entered with a typewriter space bar.

Step 1 Every request to the FEHR Data Generator must begin with a key card. The first seven columns (spaces) of the key card contain a series of switches or keys which control the operation of a variety of optional features built into the FEHR Data Generator. These keys are not described in the Player's Instructions because their operation should be under direct control of the Game Manager. We recommend that the card or cards for step 1 be supplied to players by the Game Manager. Fill out the first seven columns of the key card using the table below.

STEP 1. CARD 1

Column	Key	Operation of key (Note. A blank can be substituted for zero.)
1	0	No summary statistics are printed.
	1	Means and SD's for all variables are printed at the end of each new file search, survey, or treatment.
	2	Means and SD's for all variables are printed at the end of each sub-unit within a file search or survey. Not used for treatments.
2	0	Only the regular printer output (device 6) is obtained. (These are not suitable for direct analysis because they contain many titles and the like.)
	1	Data is output on computer file device 7 as well as on the regular printer (device 6). Your computer center can explain how to punch the device 7 results on cards or store them on disk.
3	0	Variable headings are printed for each new sub-unit within a file search or survey, but (as above) only once for each new treatment.
	1	Variable headings are printed only at the beginning of each new file search.
4	0	The costs are accumulated and continuously compared with the maximum budget entered by the team. When the charges exceed the budget by 5%, the request is aborted.
	1	Cost are computed as above, but there is no abort if the budget is exceeded.
5	0-9	This is the number of subject ID's to be entered on each line. Normally a key of 0 (zero) is used to indicate ten ID's per line. However, you would use a 1 here if the card outputs from a previous survey or file search were to be used to identify the subjects in a subsequent run. Any other number between 2 and 9 can be used if the local devices require it, but note that blank ID's are ignored.
6	0	Variable scores will be returned for each legal ID entered.
	1	Some students will drop out or move within each survey or experimental treatment (but not in a file search). Different students will drop out for each different computer run, but the proportions will be about the same. These proportions (probabilities of attrition do vary from problem to problem, however, and from group to group within problems.
7	0	The usual built-in treatment effects are in operation.
	1	The built-in treatment effects are each multiplied by a signed decimal constant. This allows the Game Manager to magnify or decrease differences among treatments. It would normally be used only when there were strong pedagogical reasons for changing the treatment effects. If a 1 is entered in column 7, a treatment multiplier card must follow immediately after the key card.

STEP 1, CARD 2.

This treatment multiplier card is necessary only if a 1 appears in column 7 or the key card. It contains a multiplier for treatment 1 in columns 1-4, for treatment 2 in columns 5-8, for treatment 3 in columns 9-12, and so on up to the total number of treatments. Each multiplier should be a decimal number.

INSTRUCTIONS FOR PREPARING CARDS FOR THE FEHR DATA GENERATOR

NOTE: Instructions preceded by an asterisk(*) are optional.

NOTE: Carefully read the NOTES at the end of each step before beginning the step!

NOTE: If you are at a terminal read 'line' for 'card' in the following instructions.

NOTE: Each step consists of one or more cards. Check to see that you have put information in the correct columns.

NOTE: Ask your Game Manager for the input and output maximums to be used with your computer system and enter them below:

The maximum number of subject ID's to be entered on one line or card is _____.

In any file search, survey or treatment, the maximum number of scores per subject which can be printed out is _____. If you need more than the maximum number of variables, enter MORE at Step 8 (for file searches and surveys) or Step 13 (for treatments), and complete a new request using the same ID's.

STEP NO.	COLUMN NO.	DESCRIPTION OF PARAMETER ENTERED
(1)		See Game Manager for the initial card or cards.
(2)	1	Enter 1 for file search, 2 for survey, 3 for treatment.
	(2-11)	Enter player-unique number (e.g., social security) for random number generator.
	(12-72)	*Enter player or team name, date, etc. (This will serve to identify your output).

NOTE: Steps (3) to (8) on pages 14 and 15 are for file searches and surveys only, while steps (9) to (13) on pages 16 and 17 are for treatments only. If you are doing a TREATMENT, skip pages 14 and 15 and go directly to step (9), page 16.

NOTE: All cards on the next two pages are for file search and survey only.
NOTE: Go to page 16 if you are running a treatment.

STEP NO.	COLUMN NO.	DESCRIPTION OF PARAMETER ENTERED
(3)	(1-10)	Enter budget maximum allocated for this file search or survey. (Use a decimal point. Do not use a $. Do not use any commas.)
	(11-71)	*Enter team's verbal title for this run. (This will serve to remind you of the nature of this run.)

NOTE: Make sure the verbal title does not begin before column 11. It can be anywhere in columns 11-71.

(4)	(1-3)	Index of the first variable to be measured (right justified, e.g., 003).
	4	Blank
	(5-7)	Index of the second variable to be measured (" ").
	8	Blank
	(9-11)	Index of the third variable to be measured (" ").
	12	Blank
	(13-15)	Index of the fourth variable to be measured (" ").
	....	Alternate blanks and three-digit indices.
	(77-79)	Index of 20th variable to be measured.

NOTE 1: You need not enter indices for 20 variables if you really want less.

NOTE 2: Each variable index must appear on the card exactly as it appears in the catalog of variables.

NOTE 3: Your game manager can tell you if your output device limits you to fewer than 20 variables.

(5)	(1)	Punch 0 (zero) here unless you know how to use the secretary. If you do know how, then enter the appropriate cards. Your game manager can help you with this convenient feature.
(6)	(1-2)	Enter the number of cards of subject ID's that will follow. The game manager can tell you how many ID's you can enter on one card. See notes for step (7) before proceeding.

STEP NO.	COLUMN NO.	DESCRIPTION OF PARAMETER ENTERED
(7)	(1-7)	Enter the first ID (e.g., 0102003 is the third student in the second sub-unit of the first unit).
	8	Blank
	(9-15)	Enter the second ID.
	16	Blank
	....	Continue with as many ID's as can fit on one card. Each ID should be followed by one blank.

NOTE 1: Anytime an entire sub-unit is to be in the sample, then use 000 for the last 3 digits, e.g., 0110000 indicates that all individuals from unit 1, sub-unit 10, are wanted. This will count as one ID.

NOTE 2: Do Not use -(dashes) in specifying the ID's.

NOTE 3: Continue doing this for as many cards as were indicated in step (6).

NOTE 4: To keep simulated costs down, you should complete sampling all sub-units in one unit before moving on to another unit.

NOTE 5: To keep simulated costs down, you should complete sampling all ID's in one sub-unit before moving on to another sub-unit.

NOTE 6: Assume that you can enter 10 ID's per card unless the game manager says otherwise.

(8)	(1-4)	Enter END	if you have completed the run.
		MORE	if you wish to add variables to the present study by returning to step (4)
		NEW	if you wish to begin another study at step (2)

NOTE: The first character must be punched in column 1 .

NOTE: All cards below are needed only for the treatment routine.

NOTE: Fill out one set of cards for steps (9)-(13) for each treatment group you wish to define.

STEP NO.	COLUMN NO.	DESCRIPTION OF PARAMETER ENTERED
(9)	(1-2)	Enter the number of cards of subject ID's in this treatment group (right justified). (The game manager can tell you how many ID's you can enter on one card. See notes for step (7) before proceeding.) No more than 99 cards of ID's can be entered.
	3	Blank
	(4)	Enter the number of measuring times (right justified) (e.g., pre and post tests require 2 measuring times; a post test alone requires 1 measuring time.) No more than 9 measuring times can be entered.
	5	Blank
	(6)	Enter the number of distinct treatments given to this group (right justified). (Usually 1 unless a series of treatments is administered.) No more than 9 distinct treatments can be entered.
	7	Blank
	(8-17)	Enter the maximum budget allocated for this treatment group. (Use a decimal point. Do not use a $. Do not use any commas.)
	(18-77)	*Enter team's verbal description of this treatment group. (This will serve to remind you of the nature of this treatment group. Be sure you do not start this before column 18.)
(10)	(1-7)	Enter the first seven digit ID of a subject or sub-unit (see notes for step (7), page 3).
	8	Blank
	(9-15)	Enter second ID.
	16	Blank
	(17-23)	Next ID
	24	Blank
	....	Continue alternating ID's and blanks.
	(73-79)	Enter tenth ID.
	80	Blank

NOTE 1: Continue entering subject ID's on cards until all subjects are entered.
NOTE 2: The number of cards of subject ID's must agree with the number in columns (1-2) of step (9).

(11.1)	(1-2)	Enter the time at which the first measurements are taken (right justified) (e.g., 01 is at time 1).
	3	Blank
	(4-6)	Enter the index of the first variable wanted at this time (use all three columns)
	7	Blank
	(8-10)	Enter the index of the second variable wanted at this time (use all three columns).
	....	Continue alternating blanks and variable indices (maximum = 19 indices)

NOTE 1: Your game manager can tell you if you are limited to fewer than 19 variables.
NOTE 2: All entries are right justified.
NOTE 3: Any pretest, of necessity, is given at time 00.
NOTE 4: See Catalog of Treatments for appropriate time units.
NOTE 5: See Catalog of Variables for appropriate variable indices.

STEP NO.	COLUMN NO.	DESCRIPTION OF PARAMETER ENTERED
(11.2)	(1-2)	Enter the time at which the second set of measurements is given (right justified).
	3	Blank
	(4-6)	Index of first variable wanted at second measuring time.
	7	Blank
	(8-10)	Index of second variable wanted at second measuring time.
	(etc.)	

NOTE: Do step (11.2) only if you asked for more than 1 measuring time in column (4) of step (9).

(11.3)		Complete cards as above for <u>each</u> measurement time.

NOTE: The number of cards for step (11) must agree with the number entered in columns (4) of step (9).

(12.1)	(1-2)	Enter beginning time for the first treatment (this is always 00).
	3	Blank
	(4-5)	Enter index of the first treatment (e.g., 01).

NOTE: See Catalog of Treatments for appropriate treatment indices.

(12.2)	(1-2)	Beginning time for the next treatment for this group. (When the second treatment for this group begins, the first treatment will automatically end.)
	3	Blank
	(4-5)	Index of second treatment.

NOTE: Do step (12.2) only if you asked for more than 1 distinct treatment in column (6) of step (9).

(12.3)		Repeat card above until all treatment changes have been defined for this treatment group.

NOTE: The number of cards for step (12) must agree with the number entered in column (6) of step (9).

(13)	(1-4)	Enter END	if you have completed the run.
		MORE	if you wish to specify another treatment group. If MORE, then you will repeat steps (9) to (13) for the new group.
		NEW	if you wish to begin again at step (2).

SECTION III:

IMPLEMENTING THE STANDARD REMAR PROBLEM

The first task in implementing FEHR at a new site is to operationalize the computer program for the standard REMAR problem. For all first-time orders, we slip an intact deck of punch cards containing the FORTRAN source code for both the main Data Generator and the REMAR problem packet. Accompanying the card deck there will be a list of instructions regarding the adaptations (if any) which must be made to the program to accommodate it to the FORTRAN IV compiler in your specific computer system. Although these are few in number and generally prescribe minor changes, they are site-unique and therefore cannot be anticipated here. It is highly desirable to obtain the services of a systems programmer at your computer center during the first compilation of the program and the setting up of efficient program storage and use procedures. Efficiency is particularly important if you plan to add more FEHR problems at a later date.

Validating the Program. Once the program has been compiled, it should be ready to operate. Nevertheless, it is wise to test its operability by using input whose effects are precisely predictable. Consequently, we supply a number of sample requests to the Data Generator, a display of each output, and a thorough discussion of the key characteristics of each. However, in the context of this manual, it is both convenient and more efficient to combine program validation with the larger task of familiarizing the users (i.e. potential game managers, research consultants, and instructors of courses to be associated with the practicum) with the capacities of the FEHR Data Generator. In discussing the familiarization requests appearing later in this section, we shall point out the output characteristics which indicate program malfunction.

In the remaining pages of this section we provide specific step-by-step guidelines for planning, organizing and running a practicum session. However, in many instances prescriptive instructions are impossible because the system was designed to adapt to different user purposes. In these cases the guidelines are necessarily more general. However, additional guidance is provided by three contrasting illustrative examples of specific uses the REMAR problem which follow immediately after the general guidelines.

The practicum session serves fundamentally different purposes in the three examples. In the workshop example the practicum is a self-contained workshop intended to upgrade the program-evaluation skills of new researchers at an educational research and development laboratory. In the module example,

on the other hand, the practicum serves as the core experience for a problem-based training module designed to provide the basic research competency prerequisite to the Ph.D. degree in Education. Finally, in the laboratory example, the practicum is used to provide "realistic" laboratory exercises which require the application of specific skills from a course in analysis of variance techniques.

The remainder of this section is organized under five main headings. In order of presentation, these are:

I. General Guidelines (pages to)
II. The Workshop Example (pages to)
III. The Module Example (pages to)
IV. The Laboratory Example (pages to)
V. Some Suggested Extensions (pages to)

GENERAL GUIDELINES

The guidelines presented in this section are intended for the novice user who has not had any previous experience with FEHR-PRACTICUM. However, exactly the same procedures should be used whenever a new problem is introduced, although with considerably less emphasis on activities designed to familiarize one with the computer program per se.

There are ten steps in planning a FEHR-PRACTICUM session. Although the emphasis placed on any one step may vary with repeated uses of the practicum, it is essential that each step receive careful attention for each new session. In chronological order, the ten steps are:

1. Defining the goals of the proposed session.
2. Choosing the personnel to conduct the session.
3. Familiarizing personnel with the Data Generator.
4. Familiarizing personnel with the practicum process.
5. Choosing a place to meet.
6. Selecting materials for the session.
7. Choosing the practicum tasks to be completed.
8. Planning the instructional activities for the session.
9. Evaluating the practicum products of the session.
10. Evaluating the instructional effectiveness of the practicum session

1. Defining Session Goals

The prospective FEHR-PRACTICUM user will have begun this manual with some broad instructional purposes in mind. Having read this far in the manual, he or she should have a general idea of what the practicum can (and cannot) do for them. To facilitate planning, it is useful at this point to specify the session goals. That is, precisely what will the player-trainees be expected to learn by participating in the practicum. These need not be stated as skill-by-skill behavioral objectives. Goals involving broad constellations of skills are more useful for instructional planning. The degree of specificity required is illustrated by the examples appearing later in this section.

2. Choosing Personnel for the Session

In previous sections we have mentioned two staff positions associated with a FEHR-PRACTICUM session: the game manager and the consultant (or consultants). In these discussions, we have attributed to the game manager the functions of both instructional planner and supervisor of the practicum activities. However, in many institutional settings it will be more convenient to have these two functions performed by different people. For that reason, we have identified three positions or functions below and listed the requisite skills for each. Unfortunately, the amount of time required in each function varies so widely from session to session (depending on purposes) that even broad guidelines cannot be established. For guidance, see the time allocations in the three examples.

Instruction. The instructional function is usually performed by one person. He or she must have the following characteristics:

a. Extensive training and experience in educational research.

b. Some experience in teaching research methods.

c. An intimate knowledge of the practicum process and experience with the problem being used.

d. Considerable experience in using all available statistical programs.

Game Manager. In the strictest sense, the game manager is required only to coordinate activities, run meetings, distribute materials, facilitate interaction with the computer, and act as the bank clearinghouse for all monetary transactions. The last two can be time consuming activities if all computer runs are batch-processed once a day and all checks recorded by hand. See the examples for illustrative time allocations.

In any case, the game manager should possess the following characteristics:

a. Competent in the use of canned programs at the local computer center.
b. Experienced in doing each practicum task with the particular problem RFP being used.
c. Reputation for promptness and dependability.
d. Capable of keeping neat, accurate, and comprehensive records.
e. Perceived as friendly and approachable by the player-trainees.
f. Good general knowledge of research/evaluation methodology is useful but not absolutely essential.

Consultants. Again, the number of consultants or the amount of time each one should be available depends on the instructional arrangements for the session--see the examples later in this section for guidance. In all cases, however, each consultant should possess the following characteristics:

a. Competent in basic statistics.
b. Competent to run the (relevant) canned statistical routines available on the local computer.
c. Considerably more training and experience in educational research/evaluation than any of the player-trainees.
d. A good grasp of the basic FEHR principles, and some experience with each of the tasks involved in the particular problem being used.
e. Free to meet at times convenient for the player-trainees.
f. Perceived as friendly and approachable by player-trainees.

3. Familiarizing Personnel with the Data Generator

The purpose of this section is to familiarize the potential users (game manager, consultant, or instructor) with the operation of the Data Generator. This is done by providing a series of sample requests designed to demonstrate various features of the computer program. Specific examples must necessarily come from a particular problem. For reasons given in section II, we have chosen to base all illustrations on REMAR. However, users having several operational problems may wish to develop similar computer-familiarization examples based on other problem areas. It is important to note that, while some substantive information may be derived from the results, examples such as these are not intended to provide information which is necessary--or even useful--in "solving" the problem concerned.

The term "request" as used here is defined as a set of punch cards which relate to a single research operation. That is, a file search, a survey, or an "experiment" involving the administration of different educational treatments. It is possible to include several requests in the same computer run. For example, a single computer run might contain file searches from several teams, a couple of surveys, and one or more "experiments" which administer two or more treatments each. In general, it is a more efficient use of computer time (and therefore cheaper) to include as many requests as possible in each computer run.

These are, however, at least two cases which require separate computer runs. The most common of these is sequential dependence among requests. For example, teams frequently must run a survey to determine which subjects they wish to put in an experiment. The second case occurs when the Game Manager wishes to use a different set of optional features (defined on card 1): one must begin a new computer run whenever a change in options is desired.

One arrangement which provides optimal computer efficiency is for requests from all teams to be collected by the Game Manager, sorted into compatable runs and then run in batches on some regular schedule. But even if this arrangement is used, it is both more convenient and pedagogically desireable for each team to be required to punch the cards for their own requests. However, this pattern would normally be used only in institutions where computer time is at a premium.

In most installations, it will be grossly inconvenient for the Game Manager to collect and run the requests personally. In this case we recommend that the teams be taught to run their own requests. This was the usual pattern used in the FEHR field evaluation studies. It was our experience that, with minor supervision for efficient request runs, the additional expense of running programs team-by-team was minimal--on the order of a 10% increase.

We shall present examples of five separate computer runs containing a total of seven requests. Computer listings of the card deck are supplied for each computer run. For each request, we shall provide verbal descriptions of the information desired, the computer options illustrated, and comments about the function of various elements in the body of the request. Because the comments continually refer the reader to the instructions for preparing a request for the Data Generator, we recommend that pages 100 to 110 be (temporarily)

removed from the manual for ready reference. The first request will be discussed on a line-by-line basis; after that, only the unique aspects will be discussed. For the reader's convenience, each computer listing and the corresponding descriptive material have been placed on facing pages wherever possible. To accommodate longer explanations, single spacing will be used for all commentary materials.

Computer Run #1. (See the card listing on the page opposite)

There is only one request included in this run: a demonstration of a file search. The resulting computer printouts appear on the pages following the listing of the request.

Request 1. The information requested consists of the scores of the last person from each class in the seven schools on the following variables (in order): race, sex, father's education, Stanford Binet IQ, criterion referenced tests of addition, subtraction, multiplication, and division, and Stanford Achievement Test sub-scale scores for airthmetic computation, arithmetic concepts, and mathematics application. These particular variables were chosen because they facilitate validation of the program. Similarly, the last person in each class is used to check the population parameters.

Options. The options used for this run are defined on card 1. Because a 1 appears in column 1, means and standard deviations will be printed at the end of the file search. The second 1 causes the computer to punch (or print) the data on file device 7, and the third 1 causes the computer to print only one heading instead of separate headings for each. The remaining zeroes on the first card result in a budget abort if the actual cost exceeds the estimated cost by 5%, a default value of ten subjects per line, no attrition (effective only for treatments), and the usual treatment effects.

Comments

(1) The first number on card 2 (col 1) calls a file search.

(2) The number 0123456789 in columns (2-11) is usually replaced with a user's social security number (or student number). Changing this number does not affect a file search, but will change the obtained scores from a survey or treatment.

(3) Card 3 establishes a maximum (FERH money) cost for this request. If this amount is exceeded by 5%, the computer program will abort. The user must then recalculate the budget. The cost of the proposed file search is calculated by summing the following:

Cost of initiating a search	$ 10.00
Cost of entering seven schools (7x20)	140.00
Cost of entering sixty-nine classrooms (69x0)	000.00
Cost of 11 scores each on 69 people (69x11x.05)	37.45
Total	$187.45

```
**********************************************************************************************
      CARDS FOR A SUBMISSION TO THE FEHR DATA GENERATOR. COMPUTER RUN NUMBER 1.
      *** ENTER THE SYSTEM CARDS TO RUN THE REMAR PROBLEM, FOLLOWED BY THE CARDS BELOW.

        CARD    CONTENTS OF CARD (BEGINNING IN COLUMN 1 )

          1     1110000
          2     10123456789 REQUEST #1. BUDGETED FILE SEARCH.
          3     100.000000   ID'S ARE LAST PERSON IN EACH CLASS.
          4     002 003 016 033 075 076 077 078 042 043 044
          5     0
          6     10
          7     0101028 0102026 0103027 0104029 0105028 0106029 0107029 0108028 0109028 0110029
          8     0111028 0111029 0112001 108001  0000000
          9     0201030 0202028 0203028 0204027 0205029 0206034 0207031
         10     0301027 0302026 0303025 0304027 0305026 0306027 0307027 0308028 0309027 0310026
         11     0311026 0312027 0313026
         12     0401026 0402025 0403027 0404024 0405027 0406026 0407025 0408027 0409027 0410026
         13     0411025 0412026
         14     0501026 0502027 0503028 0504025 0505027 0506027 0507026 0508028 0509027
         15     0601028 0602028 0603029 0604028 0605029 0606028 0607030 0608029
         16     0701029 0702029 0703029 0704030 0705031 0706029 0707030 0708028 0709029
         17     END
```

117

REQUEST #1. SUBSETED FILE SEARCH.
HERE ARE THE RESULTS OF THE FILE SEARCH
MISSING DATA HAVE A VALUE OF -3
ID'S ARE LAST PERSON IN EACH CLASS.
$ 9999.00 HAS BEEN ALLOCATED FOR THIS WORK

ID ::	2 RACE	3 SEX	16 EDCS EDUC	33 S-S	75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	44 SAT MATH APPL
1- 1- 28::	2	2	-3	-9	-9	-9	-9	-9	22	11	19
1- 2- 26::	2	1	-3	-9	-9	-9	-9	-9	13	21	14
1- 3- 27::	1	2	-9	-9	-9	-9	-9	-9	11	18	12
1- 4- 29::	2	2	-3	-9	-9	-9	-9	-9	20	15	7
1- 5- 26::	2	1	-3	-3	-9	-9	-3	-9	16	11	12
1- 6- 27::	1	1	-9	-9	-9	-9	-9	-9	13	13	14
1- 7- 28::	2	2	-3	-9	-9	-9	-9	-9	13	15	1
1- 8- 26::	1	2	-9	-9	-9	-9	-9	-9	8	0	6
1- 9- 28::	1	1	-3	-9	-9	-9	-9	-9	31	16	11
1-10- 24::	2	2	-9	-9	-9	-9	-9	-9	8	7	10
1-11- 28::	1	1	-9	-9	-9	-9	-9	-9	0	3	0
2- 1- 30::	1	1	-3	-3	-9	-9	-9	-9	34	28	24
2- 2- 26::	2	2	-3	-9	-9	-9	-9	-9	24	25	21
2- 3- 28::	1	1	-9	-9	-9	-9	-9	-9	17	21	8
2- 4- 27::	2	2	-9	-9	-9	-9	-9	-9	21	9	14
2- 5- 29::	2	2	-3	-9	-9	-9	-9	-9	25	17	18
2- 6- 34::	1	1	-9	-9	-9	-9	-9	-9	13	8	8
2- 7- 31::	2	2	-3	-9	-9	-9	-9	-9	12	17	14
3- 1- 27::	1	1	-9	-9	-9	-9	-9	-9	22	18	7
3- 2- 26::	1	1	-9	-9	-9	-9	-9	-9	32	22	9
3- 3- 25::	1	2	-9	-9	-9	-9	-9	-9	17	12	6
3- 4- 27::	2	1	-3	-9	-9	-9	-9	-9	26	28	14
3- 5- 26::	1	2	-9	-9	-9	-9	-9	-9	18	22	8
3- 6- 27::	2	2	-3	-9	-9	-9	-9	-9	20	22	24
3- 7- 27::	1	2	-3	-9	-9	-9	-9	-9	26	25	16
3- 8- 28::	2	1	-3	-9	-9	-3	-9	-9	14	18	12
3- 9- 27::	2	2	-9	-9	-9	-9	-9	-9	17	10	10
3-10- 26::	1	1	-3	-9	-9	-9	-9	-9	33	29	19
3-11- 25::	2	2	-3	-9	-9	-3	-9	-9	27	15	10
3-12- 27::	1	1	-3	-9	-9	-3	-9	-9	15	5	10
3-13- 26::	2	1	-3	-9	-9	-3	-9	-9	8	12	10
4- 1- 26::	1	2	-9	-9	-9	-9	-9	-9	19	12	15
4- 2- 25::	1	2	-9	-9	-9	-9	-9	-9	19	29	16
4- 3- 27::	1	2	-3	-9	-9	-3	-9	-9	24	24	18
4- 4- 24::	1	2	-9	-9	-9	-9	-9	-9	17	12	7
4- 5- 27::	1	2	-9	-9	-9	-9	-9	-9	12	14	10
4- 6- 26::	1	2	-3	-9	-9	-9	-9	-9	30	18	23
4- 7- 25::	1	2	-9	-9	-9	-9	-9	-9	14	15	15
4- 8- 27::	1	2	-3	-9	-9	-9	-9	-9	31	20	19
4- 9- 27::	1	1	-9	-9	-9	-9	-9	-9	29	14	16
4-10- 25::	2	1	-9	-9	-9	-9	-9	-9	20	11	12
4-11- 25::	2	1	-3	-9	-9	-9	-9	-9	19	17	14
4-12- 26::	1	2	-9	-9	-9	-9	-9	-9	18	15	8
5- 1- 26::	1	2	-9	-9	-9	-9	-9	-9	27	32	23
5- 2- 27::	1	2	-3	-9	-9	-9	-9	-9	40	34	24
5- 3- 28::	1	1	-9	-9	-9	-9	-9	-9	29	21	9
5- 4- 25::	1	2	-9	-9	-9	-9	-9	-9	16	20	20
5- 5- 27::	1	1	-3	-9	-9	-9	-9	-9	20	28	24
5- 6- 27::	1	2	-9	-9	-9	-9	-9	-9	19	12	9

[illegible]	1	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	37	24	17
[illegible]	1	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	27	23	18
[illegible]	1	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	28	25	16
[illegible]	1	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16	15	16
[illegible]	2	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	33	35	19
[illegible]	2	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5	9	11
[illegible]	2	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	13	11	10
[illegible]	2	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10	13	10
[illegible]	1	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	28	29	18
[illegible]	1	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17	6	10
[illegible]	2	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5	7	3
[illegible]	2	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21	15	7
[illegible]	2	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	14	24	16
[illegible]	2	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6	9	9
[illegible]	2	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8	2	6
[illegible]	2	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	22	22	17
[illegible]	2	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21	18	8
[illegible]	2	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	12	14	14
[illegible]	2	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16	9	3
[illegible]	2	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	17	13
MEAN	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	19.0	17.1	13.3
S.D.	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	8.8	7.8	5.3

TOTAL COST FOR THIS WORK IS $ 137.55

Below is a Listing of the Punched Output

1	1 1 28	2	2-[illegible]	22	11	19
2	1 2 26	2	1-[illegible]	13	21	14
3	1 3 27	1	2-[illegible]	11	16	12
4	1 4 29	2	2-[illegible]	20	15	7
5	1 5 28	2	1-[illegible]	16	11	12
6	1 6 29	1	1-[illegible]	13	18	14
7	1 7 29	2	2-[illegible]	13	15	1
8	1 8 28	1	2-[illegible]	8	0	6
9	1 9 28	1	1-[illegible]	21	18	11
10	110 29	2	2-[illegible]	8	7	10
11	111 28	1	1-[illegible]	0	3	0
12	2 1 30	1	1-[illegible]	34	28	24
13	2 2 28	2	2-[illegible]	24	28	21
14	2 3 28	1	1-[illegible]	17	21	8
15	2 4 27	2	2-[illegible]	21	9	14
16	2 5 28	2	2-[illegible]	25	19	18
17	2 6 29	1	1-[illegible]	15	8	8
18	2 7 31	2	2-[illegible]	12	17	14
19	2 1 27	1	1-[illegible]	22	18	7
20	3 2 26	1	1-[illegible]	32	22	15
21	3 3 25	1	2-[illegible]	17	12	5
22	3 4 27	2	1-[illegible]	20	28	19
23	3 5 26	1	2-[illegible]	18	22	9
24	3 6 27	2	2-[illegible]	20	22	25
25	3 7 27	1	2-[illegible]	20	26	10
26	[illegible]	[illegible]	1-[illegible]	14	11	11
27	3 9 27	2	2-[illegible]	17	10	10
28	310 26	1	1-[illegible]	33	29	19
29	311 26	2	2-[illegible]	27	15	10
30	312 27	1	1-[illegible]	15	5	10
31	313 26	2	1-[illegible]	8	12	10

3.12

Computer Run #2

The second computer run contains requests number 2 and 3.

Request 2. This is identical to Request 1 except for columns 1-10 of card 3, the maximum cost. This amount has been reduced to $100--a figure below the correct budget given in Request 1. The results of the aborted request are displayed on the following page.

Comments.

(1) Note also that card 17 new reads "NEW" instead of "END." The effect of this change is to send the computer back up to step 2 of the instructions to find out what additional information is needed.

(2) The abortion of Request 2 does not affect Request 3.

(3) Your data output should be identical to that from Request 1. up to the point of abortion.

Request 3. The information desired in this request is the same as that desired for Requests 1 and 2, except for two things: (1) we are now using a survey, and (2) we now desire summary statistics for each school. For this reason we have separated the ID's by school. To conserve space, only the first three schools are used in the example. Technically, we now have three independent surveys. However, we have labelled them as sub-sets of one request because they are after the same information and use the same sub-routine (survey) to get it.

Options. Since this is on the same computer run as Request 2, it must use the same options. Card 1 for this run is identical with that in the first computer run, as described above.

Comments

(1) The test scores returned in this survey will differ slightly from those returned in a file search. Moreover, the scores for one individual will change from survey to survey due to (simulated) testing error.

(2) It is possible to obtain the identical scores from a survey by using exactly the same set of cards. Specifically, the number entered in columns 2-11 of card 2 must not be changed. In addition, the order of cards in the entire run must remain the same. For example, reversing the order of Requests 2 and 3 in this run would produce different test scores from Request 3. It would not change the results of Request 2, since a file always contains the same score regardless of when it is accessed. Note that file scores contain measurement error too--it just returns the same error every time.

(3) The cost of each test score in a survey differs from test to test, and is considerably more expensive than the same score obtained from a file. For example, the Stanford Binet score costs $12.65 per student in a survey (the cost of the test plus the cost of an expert spending 1 1/2 hours to give the test),

```
**  ****************************************(  ****************************************
CARDS FOR A SUBMISSION TO THE FEHR DATA GENERATOR. COMPUTER RUN NUMBER 2.
*** ENTER THE SYSTEM CARDS TO RUN THE REMAR PROBLEM, FOLLOWED BY THE CARDS BELOW.

  CARD    CONTENTS OF CARD (BEGINNING IN COLUMN 1 )

    1     1110000
    2     10123456789 REQUEST #2. FILE SEARCH. SAME AS FIRST BUT BUDGET TOO SMALL.
    3     100.000000   ID'S ARE LAST PERSON IN EACH CLASS.
    4     002 003 016 033 075 076 077 078 042 043 044
    5     0
    6     10
    7     0101028 0102026 0103027 0104029 0105028 0106029 0107029 0108028 0109028 0110029
    8     0111028 0111029 0112001 108001  0000000
    9     0201030 0202028 0203028 0204027 0205029 0206034 0207031
   10     0301027 0302026 0303025 0304027 0305026 0306027 0307027 0308028 0309027 0310026
   11     0311026 0312027 0313026
   12     0401026 0402025 0403027 0404024 0405027 0406026 0407025 0408027 0409027 0410026
   13     0411025 0412026
   14     0501026 0502027 0503028 0504025 0505027 0506027 0507026 0508028 0509027
   15     0601028 0602028 0603029 0604028 0605029 0606028 0607030 0608029
   16     0701029 0702029 0703029 0704030 0705031 0706029 0707030 0708028 0709029
   17     NEW
   18     20123456789 REQUEST #3. SURVEY BY SCHOOLS.
   19     187.300000   SCHOOL 1--ID'S ARE LAST PERSON IN EACH CLASS.
   20     002 003 016 033 075 076 077 078 042 043 044
   21     0
   22     02
   23     0101028 0102026 0103027 0104029 0105028 0106029 0107029 0108028 0109028 0110029
   24     0111028 0111029 0112001 108001  0000000
   25     NEW
   26     20123456789 REQUEST #3 CONTINUED.
   27     130.100000   SCHOOL 2--ID'S ARE LAST PERSON IN EACH CLASS.
   28     002 003 016 033 075 076 077 078 042 043 044
   29     0
   30     01
   31     0201030 0202028 0203028 0204027 0205029 0206034 0207031
   32     NEW
   33     20123456789 REQUEST #3 CONTINUED.
   34     215.900000   SCHOOL 3--ID'S ARE LAST PERSON IN EACH CLASS.
   35     002 003 016 030 018 019 020 021 031 011 025 072 033 075 076 077 078 042 043 044
   36     0
   37     02
   38     0301027 0302026 0303025 0304027 0305026 0306027 0307027 0308028 0309027 0310026
   39     0311026 0312027 0313026
   40     END
```

but it would cost only 5 cents to retrieve it from a file if it had been administered previously--in this case it had not. Using the costs appearing in the catalog of variables (pages 15-24 of the REMAR RFP document), we discover that the cost of obtaining scores on all 11 variables from one subject is $14.30. (See table)

Therefore, the cost of each school survey would be $10 initiation + $20 school overhead + $14.30 times the number of students surveyed. The estimated costs on cards 19, 27, and 34 were computed in this way.

Variable	Race	Sex	Fath EDUC	S B I Q	CRT ADD	CRT SUB	CRT MULT	CRT DIV	SAT COMP	SAT CONC	SAT APPL
INDEX	002	003	016	033	075	076	077	078	042	043	044
COST	.10	.10	.35	12.65	.05	.05	.05	.05	.30	.30	.30

NOTE: The output for Reguest 2 is opposite. The output for request 3 begins on page .

REQUEST 42. FILE SEARCH. SAVE AS FIRST SET BUDGET TOO SMALL
HERE ARE THE RESULTS OF THE FILE SEARCH
MISSING DATA HAVE A VALUE OF -99
   IDS ARE LAST PERSON IN EACH CLASS.
$ 100.00 HAS BEEN ALLOCATED FOR THIS WORK

ID ::	2 PAGE	3 SEX	15 EDCS EDUC	55 S-B	75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	44 SAT MATH APPL
1- 1- 26::	2	2	-99	-99	-99	-99	-99	-99	22	11	19
1- 2- 26::	2	1	-99	-99	-99	-99	-99	-99	13	21	14
1- 3- 27::	1	2	-99	-99	-99	-99	-99	-99	11	18	12
1- 4- 28::	2	2	-99	-99	-99	-99	-99	-99	20	15	7
1- 5- 28::	2	1	-99	-99	-99	-99	-99	-99	16	11	12
1- 6- 29::	1	1	-99	-99	-99	-99	-99	-99	13	18	14
1- 7- 29::	2	2	-99	-99	-99	-99	-99	-99	13	15	1
1- 8- 28::	1	2	-99	-99	-99	-99	-99	-99	8	0	6
1- 9- 28::	1	1	-99	-99	-99	-99	-99	-99	31	18	11
1-10- 28::	2	2	-99	-99	-99	-99	-99	-99	9	7	10
1-11- 28::	1	1	-99	-99	-99	-99	-99	-99	0	3	0
2- 1- 30::	1	1	-99	-99	-99	-99	-99	-99	34	28	24
2- 2- 28::	2	2	-99	-99	-99	-99	-99	-99	24	26	21
2- 3- 28::	1	1	-99	-99	-99	-99	-99	-99	17	21	8
2- 4- 27::	2	2	-99	-99	-99	-99	-99	-99	21	9	14
2- 5- 29::	2	2	-99	-99	-99	-99	-99	-99	25	13	13
2- 6- 34::	1	1	-99	-99	-99	-99	-99	-99	13	8	8
2- 7- 31::	2	2	-99	-99	-99	-99	-99	-99	12	17	14
3- 1- 27::	1	1	-99	-99	-99	-99	-99	-99	22	18	7
3- 2- 26::	1	1	-99	-99	-99	-99	-99	-99	32	22	16
3- 3- 25::	1	2	-99	-99	-99	-99	-99	-99	17	12	6
3- 4- 27::	2	1	-99	-99	-99	-99	-99	-99	26	28	14
3- 5- 26::	1	2	-99	-99	-99	-99	-99	-99	18	22	9
3- 6- 27::	2	2	-99	-99	-99	-99	-99	-99	20	22	26
3- 7- 27::	1	2	-99	-99	-99	-99	-99	-99	26	26	16
3- 8- 23::	2	1	-99	-99	-99	-99	-99	-99	14	18	12
3- 9- 27::	2	2	-99	-99	-99	-99	-99	-99	17	10	10
3-10- 26::	1	1	-99	-99	-99	-99	-99	-99	33	29	19
3-11- 26::	2	2	-99	-99	-99	-99	-99	-99	27	15	10
3-12- 27::	1	1	-99	-99	-99	-99	-99	-99	15	5	10
3-13- 26::	2	2	-99	-99	-99	-99	-99	-99	8	12	10
4- 1- 26::	1	2	-99	-99	-99	-99	-99	-99	19	12	15

YOU HAVE SPENT $ 107.60
THIS IS WELL OVER THE AMOUNT THAT YOU ALLOCATED.
PROCEDURE JUST BE TERMINATED   SORRY ABOUT THAT.

Computer Run #3

The third computer run contains two requests: a survey of nine intact classes, and a one-group experiment.

Request 4. In this survey the same set of variables are used as in previous surveys, but now we are looking at all the subjects in nine entire classes, and using the FEHR secretary to select the cases to be printed.

Options. There are three changes on card 1. The 2 in column 1 results in summary statistics for each class; the zero in column 2 suppresses punching on output device 7; and the 1 in column 4 deactivates the budget abort, making it unnecessary to specify a budget on card 2.

Comments. There are two unique features in this request: the use of the FEHR secretary and the use of intact groups.

(1) Any non-zero number in column 1 of card 4 activates the secretary. See IST Unit V in Appendix of this manual for directions on using the secretary. We have arbitrarily chosen to select from the nine intact classes listed later only those subjects who have IQ's greater than 85 and a score of zero on one or more of the CRT tests. Cards 4-8, inclusively, instruct the secretary to select these subjects.

Note that you are charged for testing all subjects in each class even though they are not all printed. (The tests must be given to determine their score.)

(2) The ID's entered on card 10 all end in three zeroes. This is a signal to the computer to retrieve all of the subjects from the school and class identified by the first four digits. (See note 1 of step 7.)

Request 5. This is the first request to the treatment subroutine (see column 1 of card 12). We have chosen to use one intact classroom, and to administer treatment 1 for the first 4 weeks; treatment 2 for weeks 5,6,7 and 8; treatment 3 for weeks 9,10,11 and 12; and treatment 4 for weeks 13,14 and 15. (There is not a 16th week available in this problem--see Appendix III, page 14 of the REMAR RFP document.) To access the effects of treatments, the entire test battery was administered at the beginning of the experiment and again after survey treatment. This pattern was chosen solely to demonstrate the possibility of a series of treatments and not because it makes educational sense.

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>*****************************************************************************************
CARDS FOR A SUBMISSION TO THE FEHR DATA GENERATOR, COMPUTER RUN NUMBER 3.
*** ENTER THE SYSTEM CARDS TO RUN THE REMAR PROBLEM, FOLLOWED BY THE CARDS BELOW.

   CARD    CONTENTS OF CARD (BEGINNING IN COLUMN 1 )

     1     2011000
     2     20123456789 REQUEST #4. INTACT CLASSES SURVEYED. FEHR SECRETARY USED.
     3     00.0000000  ONLY SUBJECTS WITH IQ>85 AND ONE OR MORE CRT TESTS OF 0 ARE PRINTED.
     4     4
     5     2 04 GT 085 05 EQ 000
     6     2 04 GT 085 06 EQ 000
     7     2 04 GT 085 07 EQ 000
     8     2 04 GT 085 08 EQ 000
     9     01
    10     0501000 0505000 0509000 0601000 0605000 0608000 0701000 0705000 0709000
    11     NEW
    12     30123456789 REQUEST #5. EXPERIMENT USING THE SAME CLASSES IN ALL TREATMENTS.
    13     01 5 4 00.000000 TREATMENTS SEQUENCED.TWO INTACT CLASSES; MISSING SUBJECTS OFF.
    14     0505000 0709000
    15     00 075 076 077 078 042 043 044 002 003 016 033
    16     04 075 076 077 078 042 043 044
    17     08 075 076 077 078 042 043 044
    18     12 075 076 077 078 042 043 044
    19     15 075 076 077 078 042 043 044
    20     00 01
    21     04 02
    22     08 03
    23     12 04
    24     END
```

Variable copy

125

Options. The options chosen at the beginning of this run are still in force.

Comments.

(1) Notice that there is no option to use the FEHR secretary during a treatment.

(2) The independent (moderator) variables (race, sex, father's education, and IQ) are measured only at time 00 (pretest). It is wasteful to measure them again since (except for IQ) they cannot change. It is however unnecessary to measure these variables even at pre-test time if a survey has been done prior previously--simply select the appropriate punchcards from the survey and interleave them with the data from this experiment.

(3) Note that card 13 defines the number of ID cards in columns 1-2, the number of measurement times (5) in column 4, the number of different treatments (4) in column 6. Consequently, the ID cards must be followed by five measurement cards and four treatment cards.

(4) Note that the variables measured at pretest time (card 15) are the same as those used in the file searches and surveys, above, but that they are listed in a different order. The independent variables are listed last so that the dependent variables common to all the measurement times will always appear in the same position on the output cards. This trick greatly simplifies computer analysis of repeated-measures data.

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**********************************************************************************************
CARDS FOR A SUBMISSION TO THE FEHR DATA GENERATOR. COMPUTER RUN NUMBER 4.
*** ENTER THE SYSTEM CARDS TO RUN THE REMAR PROBLEM, FOLLOWED BY THE CARDS BELOW.

  CARD    CONTENTS OF CARD (BEGINNING IN COLUMN 1 )

    1     1011001
    2     010. 10. 10. 10.
    3     30123456789 REQUEST #6. SAME AS REQUEST #5, BUT 10X THE TREATMENT EFFECT.
    4     01 5 4 00.000000 TREATMENTS SEQUENCED,TWO INTACT CLASSES; MISSING SUBJECTS OFF.
    5     0505000 0709000
    6     00 075 076 077 078 042 043 044 002 003 016 033
    7     04 075 076 077 078 042 043 044
    8     08 075 076 077 078 042 043 044
    9     12 075 076 077 078 042 043 044
   10     15 075 076 077 078 042 043 044
   11     00 01
   12     04 02
   13     08 03
   14     12 04
   15     END
```

127

Re run.

REQUEST #3. SURVEY BY SCHOOLS.
HERE ARE THE RESULTS OF THE SURVEY.
MISSING DATA HAVE A VALUE OF -99
SCHOOL 1--ID'S ARE LAST PERSON IN EACH CLASS.
$ 187.50 HAS BEEN ALLOCATED FOR THIS WORK

ID ::	2 RACE	5 SEX	16 DADS EDUC	33 S-S	75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	44 SAT MATH APP
1- 1- 28::	2	2	3	95	10	10	10	10	18	12	
1- 2- 20::	2	1	3	116	10	10	10	10	24	20	1
1- 3- 27::	1	2	1	83	10	0	0	0	4	12	1
1- 4- 29::	2	2	4	91	10	10	10	10	16	18	1
1- 5- 28::	2	1	3	95	10	0	0	0	11	10	
1- 6- 29::	1	1	2	107	10	10	10	0	15	13	2
1- 7- 29::	2	2	2	95	10	10	0	0	12	13	1
1- 8- 28::	1	2	1	71	10	0	0	0	10	9	
1- 9- 28::	1	1	2	92	10	10	10	10	19	17	1
1-10- 29::	2	2	3	103	10	10	0	0	2	4	
1-11- 28::	1	1	1	70	0	0	0	0	1	5	

YOU HAVE SPENT $ 187.50
THIS IS WELL OVER THE AMOUNT THAT YOU ALLOCATED.
PROCEDURE MUST BE TERMINATED SORRY ABOUT THAT.

REQUEST #3 CONTINUED.
HERE ARE THE RESULTS OF THE SURVEY.
MISSING DATA HAVE A VALUE OF -99
SCHOOL 2--ID'S ARE LAST PERSON IN EACH CLASS.
$ 150.00 HAS BEEN ALLOCATED FOR THIS WORK

ID ::	2 RACE	5 SEX	16 DADS EDUC	33 S-S	75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	4 S MA AP
2- 1- 30::	1	1	3	127	10	10	10	10	26	24	
2- 2- 28::	2	2	4	121	10	10	10	10	23	23	
2- 3- 28::	1	1	4	97	10	10	10	10	12	10	
2- 4- 27::	2	2	3	84	10	10	10	10	21	23	
2- 5- 28::	2	2	3	113	10	10	10	10	24	17	
2- 6- 34::	1	1	1	75	10	0	0	0	11	5	
2- 7- 31::	2	2	2	89	10	0	0	0	12	12	

YOU HAVE SPENT $ 150.00
THIS IS WELL OVER THE AMOUNT THAT YOU ALLOCATED.
PROCEDURE MUST BE TERMINATED SORRY ABOUT THAT.

[illegible]	31 ATTN ENCE	11 CON- DUCT	25 CURR MATH GRDE	72 GRS FAST ERT	33 S-B	75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	44 SAT MATH APPL
[illegible]	2	3	5	5	120	10	10	10	10	24	21	9
[illegible]	3	4	5	21	109	10	10	10	10	21	31	18
[illegible]	2	1	3	19	70	10	0	0	0	4	12	10
[illegible]	2	3	5	16	104	10	10	10	10	20	22	11
[illegible]	2	3	3	15	96	10	10	10	10	22	17	16
[illegible]	5	2	4	19	111	10	10	10	10	23	15	11
[illegible]	5	4	4	18	117	10	10	10	10	26	19	14
[illegible]	4	2	3	19	95	10	8	0	0	12	14	10
[illegible]	3	3	3	4	88	10	10	0	0	17	18	6
[illegible]	4	4	5	23	142	10	10	10	10	29	23	16
[illegible]	5	3	3	21	120	10	10	10	10	26	11	16
[illegible]	3	1	2	8	82	10	10	0	0	14	13	12

...ST 43 CONTINUED.
...SE THE RESULTS OF THE SURVEY.
...ING DATA HAVE A VALUE OF -99
...FILE 3--ID'S ARE LAST PERSON IN EACH CLASS.
2.00 HAS BEEN ALLOCATED FOR THIS WORK

ID	::	2 RACE	3 SEX	15 DADS EDUC	30 SES	16 DAD FEEL SCHL	19 MOM FEEL SCHL	20 DAD FEEL PRGM	21 MOM FEEL PRGM	31 ATTN DNCE	11 CON-DUCT	25 CURR MATH GRDE	72 GRS PAST GRT
- 1-	27::	1	1	4	-99	5	5	5	5	3	3	5	5
- 2-	28::	1	1	3	-99	5	4	4	5	3	4	5	21
- 3-	25::	1	2	3	-99	3	4	4	3	3	1	3	19
- 4-	27::	2	1	1	-99	3	3	4	4	3	3	5	16
- 5-	26::	1	2	3	-99	5	5	5	3	2	3	3	15
- 6-	27::	2	2	3	-99	5	5	4	5	5	2	4	19
- 7-	27::	1	2	5	-99	4	4	3	3	5	4	4	16
- 8-	28::	2	1	3	-99	4	5	4	4	4	2	3	19
- 9-	27::	2	2	3	-99	5	4	5	5	3	3	3	4
-10-	25::	1	1	5	-99	5	5	5	5	4	4	5	23
-11-	28::	2	2	3	-99	5	5	4	3	5	3	3	21
-12-	27::	1	1	5	-99	4	4	4	5	3	1	2	8

(YOU HAVE SPENT $ 237.40)
IT IS WELL OVER THE AMOUNT THAT YOU ALLOCATED.
THIS JOB MUST BE TERMINATED SORRY ABOUT THAT.

REGIST ###. INTACT CLASSES SURVEYED. PERK SECRETARY USED.
HERE ARE THE RESULTS OF THE SURVEY.
MISSING DATA HAVE A VALUE OF -.9
ONLY SUBJECTS WITH 1.2.3 AND C.E OR MORE CRT TESTS OF 0 AR
$ 0.0 HAS BEEN ALLOCATED FOR THIS WORK

ID ::	2 RACE	3 SEX	16 EXCS FOCC	33 S-B	75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	44 SAT MATH APPL
5- 5- 17::	1	2	4	95	10	10	0	0	14	11	12
5- 5- 26::	1	2	3	87	10	10	10	0	14	9	9
MEAN ::	1.0	2.0	3.5	91.0	10.0	10.0	5.0	0.0	14.0	10.0	10.5
S.D. ::	0.0	0.0	0.5	4.0	0.0	0.0	5.0	0.0	0.0	1.0	1.5
5- 6- 4::	1	1	5	109	10	10	0	0	14	18	9
5- 6- 5::	1	2	3	90	0	0	0	0	6	6	0
5- 6- 14::	1	2	4	90	10	0	0	0	11	16	11
5- 6- 18::	1	2	4	95	10	0	0	0	4	5	9
5- 6- 20::	1	1	4	92	10	10	0	0	12	8	12
5- 6- 22::	1	2	4	100	10	0	0	0	10	11	12
5- 6- 25::	1	2	3	120	10	10	0	0	8	16	20
MEAN ::	1.0	1.7	4.1	99.4	9.0	4.0	0.0	0.0	9.3	11.4	10.4
S.D. ::	0.0	0.5	0.6	10.5	3.0	4.9	0.0	0.0	3.2	4.9	5.5
6- 1- 1::	1	2	1	102	10	5	0	0	7	7	13
6- 1- 3::	1	2	2	91	10	10	0	0	10	10	15
MEAN ::	1.0	2.0	1.5	96.5	10.0	7.5	0.0	0.0	8.5	8.5	14.0
S.D. ::	0.0	0.0	0.5	7.5	0.0	2.5	0.0	0.0	1.5	1.5	1.0
6- 5- 2::	1	1	2	95	10	10	3	0	13	16	20
6- 5- 5::	1	2	1	94	0	0	0	0	6	6	14
6- 5- 13::	1	1	1	109	10	6	0	0	14	20	14
6- 5- 16::	2	2	3	91	10	10	0	0	15	12	16
6- 5- 17::	1	2	2	93	0	0	0	0	5	3	8
6- 5- 19::	2	2	3	99	10	10	10	0	20	14	10
MEAN ::	1.5	1.7	2.0	96.5	8.7	8.0	2.2	0.0	12.2	11.3	13.7
S.D. ::	0.5	0.5	0.8	5.1	4.7	4.2	3.7	0.0	5.2	5.8	3.9
6- 8- 2::	2	1	1	88	0	0	0	0	7	7	8
6- 8- 5::	2	2	2	101	10	0	0	0	13	8	8
6- 8- 6::	2	1	2	95	10	10	0	0	16	8	10
6- 8- 11::	2	1	2	101	10	10	10	0	19	11	16
6- 8- 13::	2	1	1	89	10	0	0	0	12	11	10
6- 8- 16::	1	2	2	95	10	10	0	0	14	14	15
6- 8- 18::	2	2	3	101	10	10	0	0	16	15	17
6- 8- 24::	2	2	1	87	10	10	0	0	7	21	13
MEAN ::	1.5	1.5	1.7	93.5	8.7	8.2	1.2	0.0	13.0	12.5	12.1
S.D. ::	0.5	0.5	0.7	6.4	3.3	4.3	3.3	0.0	4.0	4.9	3.4
7- 1- 1::	1	2	1	94	10	10	10	0	17	20	14
7- 1- 13::	2	1	2	87	10	0	0	0	11	14	9
7- 1- 14::	2	2	1	87	10	10	2	0	13	19	13
7- 1- 20::	2	2	1	87	10	6	0	0	8	16	10
7- 1- 28::	1	1	1	103	10	10	10	0	16	12	16
MEAN ::	1.5	1.6	1.2	91.5	10.0	7.5	4.4	0.0	13.0	16.2	12.5
S.D. ::	0.5	0.5	0.4	6.5	0.0	5.0	4.5	0.0	3.3	3.0	3.2
7- 5- 1::	2	2	1	111	10	10	0	0	11	6	11
7- 5- 15::	2	1	3	96	10	0	0	0	9	10	12
7- 5- 19::	-	-	-	101	10	-	-	0	-	-	
7- 5- 20::	1	2	1	95	10	0	0	0	9	11	13
7- 5- 24::	1	1	1	100	10	0	0	0	10	22	14
7- 5- 26::	1	1	3	93	10	10	8	0	12	17	11
MEAN ::	1.4	1.5	2.0	97.5	10.0	5.5	1.5	0.0	9.2	13.0	11.5

	S.D. ::	0.5	0.5	1.0	0.7	0.0	4.7	3.0	0.0	2.3	5.2	1.9
7-	3- 6::	2	2	3	[illegible]	10	0	0	0	14	0	0
7-	3- 10::	2	1	3	[illegible]	5	0	0	0	12	7	7
7-	- [illegible]::	2	2	3	[illegible]	10	10	6	0	10	13	8
	- 16::	2	1	3	10.7	10	10	0	0	16	14	12
7-	- 20::	2	1	3	[illegible]	10	10	0	0	14	17	14
7-	- 25::	2	2	3	[illegible]	10	0	0	0	11	12	7
7-	- 26::	2	2	2	91	10	10	0	0	13	16	7
	MEAN ::	2.0	1.6	2.9	[illegible]	9.3	5.7	0.7	0.0	12.3	11.3	7.9
	S.D. ::	0.0	0.5	0.3	7.7	1.7	4.7	2.1	0.0	1.9	5.5	4.1

TOTAL COST FOR THIS WORK IS $ 3777.00

REQUEST NO. EXPERIMENT USING THE SAME CLASSES AT ALL TREATM
HERE ARE THE RESULTS OF THE TREATMENTS.
MISSING DATA HAVE A VALUE OF -9.
TREATMENTS SEQUENCED.TWO INTACT CLASSES; MISSING SUBJECTS OF
$ 0.0 HAS BEEN ALLOCATED FOR THIS NORM

HERE ARE THE RESULTS AT TIME 0.

TREATMENTS SEQUENCED.TWO INTACT CLASSES; MISSING SUBJECTS OF

ID	::	75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	44 SAT MATH APPL	2 RACE	3 SEX	16 JADS EDUC	33 S-B
5- 5- 1	::	10	10	10	10	21	15	15	1	2	4	108
5- 5- 2	::	10	10	10	10	29	26	25	1	1	5	119
5- 5- 3	::	10	10	10	10	14	24	15	1	2	3	114
5- 5- 4	::	10	10	10	10	27	28	18	1	2	5	133
5- 5- 5	::	10	10	10	10	23	23	24	1	2	4	115
5- 5- 6	::	10	10	10	10	30	22	15	1	1	4	129
5- 5- 7	::	10	10	10	10	19	20	14	1	2	5	111
5- 5- 8	::	10	10	10	10	29	22	15	1	1	5	119
5- 5- 9	::	10	10	10	10	24	19	6	1	1	4	120
5- 5- 10	::	10	10	10	10	17	8	8	2	1	3	110
5- 5- 11	::	10	10	10	10	35	24	21	1	1	5	142
5- 5- 12	::	10	10	10	10	33	22	17	1	2	5	118
5- 5- 13	::	10	10	10	10	24	21	15	1	2	5	113
5- 5- 14	::	10	10	10	10	29	13	20	1	2	5	123
5- 5- 15	::	10	10	10	10	22	15	11	1	1	5	96
5- 5- 16	::	10	10	10	10	21	23	20	1	2	4	117
5- 5- 17	::	10	10	0	0	16	22	23	1	2	4	109
5- 5- 18	::	10	10	10	10	20	17	15	1	1	4	108
5- 5- 19	::	10	10	10	10	29	22	17	1	2	5	125
5- 5- 20	::	10	10	10	10	34	30	17	1	1	4	87

21 CASES OMITTED TO SAVE SPACE

7- 9- 15	::	10	10	0	0	10	18	17	2	2	3	97
7- 9- 16	::	10	5	0	0	4	19	14	2	1	2	92
7- 9- 17	::	0	0	0	0	12	6	4	2	2	2	76
7- 9- 18	::	10	0	0	0	7	7	10	2	2	1	84
7- 9- 19	::	10	10	10	10	26	18	17	2	2	3	122
7- 9- 20	::	10	10	0	0	15	13	10	2	1	2	92
7- 9- 21	::	10	10	10	10	25	14	17	2	1	2	96
7- 9- 22	::	10	10	10	10	13	15	13	2	1	3	119
7- 9- 23	::	0	0	0	0	0	3	2	2	1	1	70
7- 9- 24	::	10	0	0	0	9	12	9	2	1	1	70
7- 9- 25	::	10	0	0	0	8	10	9	2	2	2	82
7- 9- 26	::	10	5	0	0	10	9	4	2	2	2	75
7- 9- 27	::	10	10	10	10	18	11	13	2	2	2	109
7- 9- 28	::	10	10	0	0	12	23	10	2	2	3	97
7- 9- 29	::	0	0	0	0	12	9	11	2	1	1	71
MEAN	::	9.1	7.2	5.0	5.5	16.2	15.0	13.2	1.6	1.6	3.1	99.7
S.D.	::	2.7	4.4	4.8	5.3	8.3	7.3	6.0	0.5	0.5	1.5	19.1

MEANS FOR THE RESULTS AT TIME 4.

TREATMENTS SEQUENCED, FOR INTACT CLASSES; MISSING SUBJECTS OR

ID		75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	44 SAT MATH APPL
5- 5-	1:	10	10	10	10	17	20	19
5- 5-	2:	10	10	10	10	26	29	24
5- 5-	3:	10	10	10	10	23	26	23
5- 5-	4:	10	10	10	10	33	24	17
5- 5-	5:	10	10	10	10	32	25	20
5- 5-	6:	10	10	10	10	27	22	19
5- 5-	7:	10	10	10	10	23	18	13
5- 5-	8:	10	10	10	10	32	20	18
5- 5-	9:	10	10	10	10	20	17	13
5- 5-	10:	10	10	10	10	16	15	9
5- 5-	11:	10	10	10	10	39	21	18
5- 5-	12:	10	10	10	10	27	23	16
5- 5-	13:	10	10	10	10	23	20	18
5- 5-	14:	10	10	10	10	33	23	9
5- 5-	15:	10	10	10	10	21	15	10
5- 5-	16:	10	10	10	10	28	24	21
5- 5-	17:	10	10	0	0	13	23	17
5- 5-	18:	10	10	10	10	26	11	16
5- 5-	19:	10	10	10	10	40	24	22
5- 5-	20:	10	10	10	10	36	24	14
5- 5-	21:	10	10	10	10	34	24	19
5- 5-	22:	10	10	10	10	24	19	15
5- 5-	23:	10	10	10	10	20	14	12
5- 5-	24:	10	10	10	10	23	33	20
5- 5-	25:	10	10	10	10	19	20	20
5- 5-	26:	10	10	9	0	11	12	11
5- 5-	27:	10	10	10	10	29	15	14
7- 7-	1:	10	10	10	0	22	10	8
7- 7-	2:	0	0	0	0	11	9	9

10 CASES OMITTED TO SAVE SPACE

7- 7-	13:	10	0	0	0	13	7	7
7- 7-	14:	10	0	0	0	16	7	11
7- 7-	15:	10	10	0	0	20	7	15
7- 7-	16:	10	7	0	0	18	12	11
7- 7-	17:	0	0	0	0	5	2	0
7- 7-	18:	10	0	0	0	11	7	7
7- 7-	19:	10	10	10	10	21	27	18
7- 7-	20:	10	10	0	0	12	19	11
7- 7-	21:	10	10	10	10	21	11	12
7- 7-	22:	10	10	10	0	16	15	7
7- 7-	23:	0	0	0	0	2	2	0
7- 7-	24:	10	0	0	0	14	13	7
7- 7-	25:	10	0	0	0	8	19	6
7- 7-	26:	10	10	0	0	9	12	13
7- 7-	27:	10	10	10	10	20	20	14
7- 7-	28:	10	10	10	0	15	17	10
7- 7-	29:	0	0	0	0	4	12	11
MEAN	::	9.3	7.3	6.4	5.3	19.5	16.5	13.0
S.D.	::	2.6	4.4	4.8	4.9	9.0	7.2	5.4

HERE ARE THE RESULTS AT TIME 12.

TREATMENTS SEQUENCED. THE INTACT CLASSES; MISSING SUBJECTS OF

ID	75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	44 SAT MATH APPL
5- 5- 1:	10	10	10	10	40	20	22
5- 5- 2:	10	10	10	10	30	37	21
5- 5- 3:	10	10	10	10	30	25	16
5- 5- 4:	10	10	10	10	47	34	18
5- 5- 5:	10	10	10	10	35	36	25
5- 5- 17:	10	10	10	10	22	17	13
5- 5- 18:	10	10	10	10	33	25	15
5- 5- 19:	10	10	10	10	43	34	21
5- 5- 20:	10	10	10	10	39	30	17
5- 5- 21:	10	10	10	10	43	27	19
5- 5- 22:	10	10	10	10	35	16	19
5- 5- 23:	10	10	10	10	30	16	12
5- 5- 24:	10	10	10	10	27	28	26
5- 5- 25:	10	10	10	10	30	27	16
5- 5- 26:	10	10	10	10	17	12	12
5- 5- 27:	10	10	10	10	35	25	22
7- 9- 1:	10	10	10	10	20	7	8
7- 9- 2:	10	0	0	0	6	9	8
7- 9- 3:	10	10	10	10	33	17	16
7- 9- 4:	10	10	10	10	24	12	14
7- 9- 5:	10	10	10	10	16	14	12
7- 9- 6:	10	10	10	10	26	15	14
7- 9- 7:	10	10	10	10	15	7	11
7- 9- 8:	10	10	10	10	21	2	6
7- 9- 9:	10	10	10	10	23	6	11
7- 9- 10:	10	10	10	10	9	15	10
7- 9- 11:	10	10	10	7	9	13	3
7- 9- 12:	10	10	10	10	19	10	4
7- 9- 13:	10	10	10	10	17	3	7
7- 9- 14:	10	10	10	10	17	11	14
7- 9- 15:	10	10	10	10	24	10	10
7- 9- 16:	10	10	10	10	25	20	12
7- 9- 17:	10	0	0	0	11	5	11
7- 9- 18:	10	10	7	0	15	9	10
7- 9- 19:	10	10	10	10	33	26	26
7- 9- 20:	10	10	10	10	19	19	14
7- 9- 21:	10	10	10	10	30	20	15
7- 9- 22:	10	10	10	10	27	13	8
7- 9- 23:	0	0	0	0	3	0	5
7- 9- 24:	10	10	10	10	16	14	10
7- 9- 25:	10	10	10	10	17	17	16
7- 9- 26:	10	10	10	10	20	14	11
7- 9- 27:	10	10	10	10	26	13	11
7- 9- 28:	10	10	10	10	18	13	10
7- 9- 29:	10	10	0	0	20	15	9
MEAN :	9.8	9.5	9.2	9.1	20.5	10.0	14.4
S.D. :	1.3	2.3	2.6	2.7	10.4	8.7	5.3

HERE ARE THE RESULTS AT TIME 3.

TREATMENTS SEQUENCED.THE INTACT CLASSES: MISSING SUBJECTS OF

ID	75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	44 SAT MATH APPL
5- 5- 1::	10	10	10	10	37	28	18
5- 5- 2::	10	10	10	10	30	27	15
5- 5- 3::	10	10	10	10	29	23	16
5- 5- 4::	10	10	10	10	41	26	27
5- 5- 5::	10	10	10	10	39	32	20
5- 5- 6::	10	10	10	10	26	23	24
5- 5- 7::	10	10	10	10	29	24	21
5- 5- 8::	10	10	10	10	32	22	18
5- 5- 9::	10	10	10	10	24	21	16
5- 5- 10::	10	10	10	10	18	9	12
5- 5- 11::	10	10	10	10	45	30	17
5- 5- 12::	10	10	10	10	37	28	18
5- 5- 13::	10	10	10	10	30	23	25
5- 5- 14::	10	10	10	10	26	26	10
5- 5- 15::	10	10	10	10	28	20	17
5- 5- 16::	10	10	10	10	27	22	14
5- 5- 17::	10	10	10	10	19	25	14
7- 9- 1::	10	10	10	10	20	3	15
7- 9- 2::	10	0	0	0	12	9	6
7- 9- 3::	10	10	10	10	22	17	10
7- 9- 4::	10	10	6	0	19	11	13
7- 9- 5::	10	10	10	0	19	15	11
7- 9- 6::	10	10	10	10	21	17	11
7- 9- 7::	10	10	10	10	23	14	3
7- 9- 8::	10	10	10	0	19	10	8
7- 9- 9::	10	10	10	10	23	12	9
7- 9- 10::	10	10	0	0	17	16	10
7- 9- 11::	10	10	0	0	14	13	10
7- 9- 12::	10	10	10	0	15	7	12
7- 9- 13::	10	10	10	0	17	5	9
7- 9- 14::	10	10	9	0	22	6	10
7- 9- 15::	10	10	10	10	10	19	13
7- 9- 16::	10	10	10	10	19	15	12
7- 9- 17::	10	0	0	0	9	5	7
7- 9- 18::	10	4	0	0	12	10	8
7- 9- 19::	10	10	10	10	41	20	24
7- 9- 20::	10	10	10	10	23	14	14
7- 9- 21::	10	10	10	10	33	13	15
7- 9- 22::	10	10	10	10	21	15	10
7- 9- 23::	0	0	0	0	0	0	5
7- 9- 24::	10	10	0	0	15	9	8
7- 9- 25::	10	10	10	0	10	15	16
7- 9- 26::	10	10	10	10	20	12	6
7- 9- 27::	10	10	10	10	22	13	12
7- 9- 28::	10	10	10	10	18	16	15
7- 9- 29::	10	0	0	0	0	13	17
MEAN ::	9.3	9.2	8.4	7.3	24.3	17.0	14.4
S.D. ::	1.3	2.7	3.5	4.4	10.0	7.0	5.4

HERE ARE THE RESULTS AT TIME 15.

TREATMENTS SEQUENCED.TWO INTACT CLASSES: MISSING SUBJECTS OF

ID	75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	44 SAT MATH APPL
5- 5- 1::	10	10	10	10	41	22	20
5- 5- 2::	10	10	10	10	55	31	21
5- 5- 3::	10	10	10	10	38	27	19
5- 5- 4::	10	10	10	10	49	21	15
5- 5- 5::	10	10	10	10	46	31	25
5- 5- 6::	10	10	10	10	40	26	20
5- 5- 7::	10	10	10	10	35	20	17
5- 5- 8::	10	10	10	10	54	11	21
5- 5- 9::	10	10	10	10	36	17	17
5- 5- 10::	10	10	10	10	31	12	14
5- 5- 11::	10	10	10	10	49	30	20
5- 5- 12::	10	10	10	10	45	30	19
5- 5- 13::	10	10	10	10	40	23	20
5- 5- 14::	10	10	10	10	38	30	17
5- 5- 15::	10	10	10	10	23	14	10
5- 5- 16::	10	10	10	10	40	27	16
5- 5- 17::	10	10	10	10	23	21	9
5- 5- 18::	10	10	10	10	37	22	13
5- 5- 19::	10	10	10	10	46	31	20
5- 5- 20::	10	10	10	10	43	27	16
5- 5- 21::	10	10	10	10	44	23	18
5- 5- 22::	10	10	10	10	43	26	19
5- 5- 23::	10	10	10	10	29	20	17
5- 5- 24::	10	10	10	10	31	22	24
5- 5- 25::	10	10	10	10	35	24	16
5- 5- 26::	10	10	10	10	20	10	13
5- 5- 27::	10	10	10	10	41	20	20
7- 9- 1::	10	10	10	10	27	5	14
7- 9- 2::	10	10	10	9	9	7	5
7- 9- 3::	10	10	10	10	38	24	13
7- 9- 4::	10	10	10	10	22	12	7
7- 9- 5::	10	10	10	10	17	10	13
7- 9- 6::	10	10	10	10	30	9	4
7- 9- 7::	10	10	10	10	30	11	13

19 CASES OMITTED TO SAVE SPACE

7- 9- 27::	10	10	10	10	34	11	11
7- 9- 28::	10	10	10	10	25	13	19
7- 9- 29::	10	10	10	9	18	15	10
MEAN ::	9.8	9.8	9.8	9.9	33.5	17.9	14.1
S.D. ::	1.3	1.3	1.3	2.9	11.1	8.1	5.7

TOTAL COST FOR THIS WORK IS $ 12527.20

Computer Run #4: Request 6.

The sole purpose of computer run is to demonstrate the modification of treatments by a Game Manager. This option is involved by placing a 1 in column 7 of the first card. When this is done, a treatment card must follow immediately. Card 2 tells the computer to multiply every treatment effect by 10. In all other respects, request #6 is identical to request #5. The results of this treatment modification can be seen by comparing the outputs of request 5 and 6.

REQUEST #9. SAME AS REQUEST #3, BUT FIX THE TREATMENT EFFEC
HERE ARE THE RESULTS OF THE TREATMENTS.
MISSING DATA HAVE A VALUE OF -99
TREATMENTS SEQUENCED.TWO INTACT CLASSES; MISSING SUBJECTS OF
0.0 HAS BEEN ALLOCATED FOR THIS WORK

HERE ARE THE RESULTS AT TIME 0.

TREATMENTS SEQUENCED.TWO INTACT CLASSES; MISSING SUBJECTS OF

ID	::	75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	44 SAT MATH APPL	2 RACE	3 SEX	16 DADS EDUC	33 S-B
5- 5- 1	::	10	10	10	10	21	18	19	1	2	4	108
5- 5- 2	::	10	10	10	10	29	28	25	1	1	5	119
5- 5- 3	::	10	10	10	10	14	24	15	1	2	3	114
5- 5- 4	::	10	10	10	10	27	28	18	1	2	5	133
5- 5- 5	::	10	10	10	10	23	23	20	1	2	4	116
5- 5- 6	::	10	10	10	10	30	22	15	1	1	4	129
5- 5- 7	::	10	10	10	10	19	21	14	1	2	5	111
5- 5- 8	::	10	10	10	10	29	24	15	1	1	5	119
5- 5- 9	::	10	10	10	10	[illegible]	[illegible]	8	1	1	4	120
5- 5- 10	::	10	10	10	10	17	8	8	2	1	3	110
5- 5- 11	::	10	10	10	10	[illegible]	24	21	1	1	5	142
5- 5- 12	::	10	10	10	10	[illegible]	22	17	1	2	5	118
5- 5- 13	::	10	10	10	10	[illegible]	21	[illegible]	1	2	5	113
5- 5- 14	::	10	10	10	10	[illegible]	15	20	1	2	5	123
5- 5- 15	::	10	10	10	10	22	15	11	1	1	5	80
5- 5- 16	::	10	10	10	[illegible]	[illegible]	[illegible]	20	1	2	4	117
5- 5- 17	::	10	10	[illegible]	0	[illegible]	22	23	1	2	4	105
5- 5- 18	::	10	10	10	10	[illegible]	17	15	1	1	4	105
5- 5- 19	::	10	10	10	10	[illegible]	22	17	1	2	5	126
5- 5- 20	::	10	10	10	10	34	[illegible]	17	1	1	4	87
5- 5- 21	::	10	10	10	10	28	29	16	1	1	5	119
5- 5- 22	::	10	10	10	[illegible]	16	12	11	2	2	4	123
5- 5- 23	::	10	10	10	[illegible]	20	15	7	1	2	4	87
5- 5- 24	::	10	10	10	10	29	29	22	1	1	5	107
5- 5- 25	::	10	10	10	10	[illegible]	29	9	1	2	5	116
5- 5- 26	::	10	10	10	0	17	17	20	1	2	3	74
5- 5- 27	::	10	10	10	10	30	22	22	1	1	5	121
7- 9- 1	::	10	10	0	0	13	13	10	2	2	1	85
7- 9- 2	::	0	0	0	0	7	5	7	2	1	1	77
7- 9- 3	::	10	10	10	10	17	10	12	2	1	4	103
7- 9- 4	::	10	0	0	0	13	0	7	2	2	1	81
7- 9- 5	::	10	0	0	0	7	14	14	2	1	1	80
7- 9- 6	::	10	10	10	10	17	11	5	2	1	4	9[illegible]
7- 9- 7	::	10	10	0	0	14	9	9	2	2	3	91
7- 9- 8	::	10	0	0	0	6	4	3	2	2	2	97
7- 9- 9	::	10	10	0	0	18	11	9	2	2	2	76
7- 9- 10	::	0	0	0	0	10	5	12	2	1	3	99
7- 9- 11	::	10	0	0	0	7	8	4	2	2	1	74
7- 9- 12	::	10	0	0	0	20	15	4	2	2	1	77
7- 9- 13	::	10	0	0	0	14	12	14	2	1	1	82
7- 9- 14	::	10	0	0	0	15	10	14	2	2	1	91

REQUEST #7. EXPERIMENT USING SAME CLASSES IN ALL TREATMENTS
HERE ARE THE RESULTS OF THE TREATMENTS.
MISSING DATA HAVE A VALUE OF -99
TREATMENT 1. TWO INTACT CLASSES.
$ 0.0 HAS BEEN ALLOCATED FOR THIS WORK

HERE ARE THE RESULTS AT TIME 15.

TREATMENT 1. TWO INTACT CLASSES.

ID ::	2 RACE	3 SEX	16 CLASS LOCC	33 S-S	75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	44 SAT MATH APPL
5- 5- 1::	1	2	3	125	10	10	10	10	22	19	12
5- 5- 2::	1	1	5	119	10	10	10	10	28	27	22
5- 5- 3::	1	2	4	111	10	10	10	10	18	23	18
5- 5- 4::	1	2	5	113	10	10	10	10	31	32	21
5- 5- 5::	1	2	4	125	10	10	10	10	28	26	19
5- 5- 6::	1	1	4	122	10	10	10	10	29	22	23
5- 5- 7::	1	2	5	123	10	10	10	10	22	19	14
5- 5- 8::	1	1	4	110	10	10	10	10	30	22	19
5- 5- 9::	1	1	4	106	10	10	10	10	16	19	20
5- 5- 10::	2	1	4	105	10	10	10	10	13	12	15
5- 5- 11::	1	1	5	133	10	10	10	10	40	29	23
5- 5- 12::	1	2	4	102	10	10	10	10	29	28	21
5- 5- 13::	1	2	4	116	10	10	10	10	23	24	17
5- 5- 14::	1	2	5	124	10	10	10	10	31	17	15
5- 5- 15::	1	1	4	90	10	10	10	10	18	20	13
5- 5- 16::	1	2	3	131	10	10	10	10	29	26	17
7- 9- 15::	2	2	3	97	10	10	0	0	20	12	11
7- 9- 16::	2	1	3	91	10	10	0	0	15	10	10
7- 9- 17::	2	2	1	83	5	0	0	0	6	7	5
7- 9- 18::	2	2	1	70	10	0	0	0	11	11	13
7- 9- 19::	2	2	3	122	10	10	10	10	23	22	20
7- 9- 20::	2	1	2	77	10	10	10	0	14	15	16
7- 9- 21::	2	1	2	89	10	10	10	10	26	14	17
7- 9- 22::	2	1	3	89	10	10	10	10	19	12	19
7- 9- 23::	2	1	1	70	0	0	0	0	0	6	4
7- 9- 24::	2	1	1	70	10	0	0	0	15	16	6
7- 9- 25::	2	2	1	89	10	0	0	0	11	10	10
7- 9- 26::	2	2	2	81	10	10	0	0	9	9	4
7- 9- 27::	2	2	2	100	10	10	10	10	19	16	19
7- 9- 28::	2	2	3	96	10	10	10	2	15	15	11
7- 9- 29::	2	1	2	70	0	0	0	0	6	7	13
MEAN ::	1.6	1.6	3.1	98.9	9.4	7.7	6.7	5.9	19.3	16.0	13.9
S.D. ::	0.5	0.5	1.4	13.2	2.3	4.0	4.7	4.7	8.2	8.0	5.7

TOTAL COST FOR THIS WORK IS $ 300.00

EAT ..T 2. TWO INTACT CLASSES.
0.0 HAS BEEN ALLOCATED FOR THIS WORK

RE ..E THE RESULTS AT TIME 15.

EATMENT 2. TWO INTACT CLASSES.

ID ::	2 RACE	3 SEX	16 CADS EDUC	33 S-S	75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	44 SAT MATH APPL
- ..- 1::	1	2	5	130	10	10	10	10	34	27	16
- ..- 2::	1	1	5	131	10	10	10	10	31	24	12
- ..- 3::	1	2	4	125	10	10	10	10	35	21	11
- ..- 4::	1	2	4	124	10	10	10	10	46	16	23
- ..- 5::	1	2	4	124	10	10	10	10	41	30	23
- ..- 6::	1	1	5	121	10	10	10	10	47	26	21
- ..- 7::	1	2	5	115	10	10	10	10	35	20	19
- ..- 8::	1	2	5	117	10	10	10	10	45	25	17
- ..- 9::	1	1	5	101	10	10	10	10	31	14	13
- ..- 10::	2	1	3	103	10	10	10	10	27	16	17
- ..- 11::	1	1	5	124	10	10	10	10	44	20	19
- ..- 12::	1	2	5	112	10	10	10	10	40	22	19
- ..- 13::	1	2	5	113	10	10	10	10	40	26	19
- ..- 14::	1	2	5	119	10	10	10	10	40	19	16
- ..- 15::	1	1	5	100	10	10	10	10	23	17	18
- ..- 16::	1	2	3	125	10	10	10	10	33	25	17
- ..- 17::	1	2	3	109	10	10	10	10	24	13	16
- ..- 18::	1	1	3	100	10	10	10	10	32	19	15
- ..- 19::	1	2	5	142	10	10	10	10	42	20	23
- ..- 20::	1	1	4	100	10	10	10	10	43	22	19
- ..- 17::	2	2	1	70	10	10	9	0	15	5	2
- ..- 18::	2	2	1	78	10	10	10	10	23	11	10
- ..- 19::	2	2	3	144	10	10	10	10	37	30	21
- ..- 20::	2	1	3	73	10	10	10	10	29	18	14
- ..- 21::	2	1	2	93	10	10	10	10	30	16	19
- ..- 22::	2	1	4	103	10	10	10	10	29	9	14
- ..- 23::	2	1	1	70	0	0	0	0	0	0	1
- ..- 24::	2	1	1	70	10	10	10	10	21	21	8
- ..- 25::	2	2	3	92	10	10	10	10	23	20	12
- ..- 26::	2	2	3	81	10	10	10	10	33	9	9
- ..- 27::	2	2	2	93	10	10	10	10	27	17	21
- ..- 28::	2	2	4	99	10	10	10	10	27	14	11
- ..- 29::	2	1	1	75	10	10	10	3	22	13	11
..N ::	1.6	1.6	3.8	100.1	9.8	9.8	9.6	9.4	29.1	16.8	14.2
S.. .. ::	0.5	0.5	1.4	20.2	1.3	1.3	1.3	2.3	9.3	7.0	5.9

THE COST FOR THIS WORK IS $ 17300.80

TREATMENT 3. TWO INTACT CLASSES.
$ 2.0 HAS BEEN ALLOCATED TO THIS WORK

HERE ARE THE RESULTS AT TIME 15.

TREATMENT 3. TWO INTACT CLASSES.

ID	2 RACE	3 SEX	16 EXOS EDUC	33 S-S	75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	44 SAT MATH APPL
3- 3- 1::	1	2	4	132	10	10	10	10	31	19	22
3- 3- 2::	1	1	5	108	10	10	10	10	30	24	23
3- 3- 3::	1	2	3	112	10	10	10	10	30	18	25
3- 3- 4::	1	2	5	130	10	10	10	10	36	20	16
3- 3- 5::	1	2	4	123	10	10	10	10	37	27	26
3- 3- 6::	1	1	5	115	10	10	10	10	35	17	17
3- 3- 7::	1	2	5	112	10	10	10	10	36	23	15
3- 3- 8::	1	1	5	113	10	10	10	10	38	19	19
3- 3- 9::	1	1	4	113	10	10	10	10	33	20	14
3- 3- 10::	2	1	3	99	10	10	10	10	20	10	12
3- 3- 11::	1	1	5	134	10	10	10	10	43	24	20
3- 3- 12::	1	2	4	116	10	10	10	10	40	20	22
3- 3- 13::	1	2	4	125	10	10	10	10	32	19	20
3- 3- 14::	1	2	5	107	10	10	10	10	32	12	[illegible]
3- 3- 15::	1	1	3	91	10	10	10	10	31	23	17
3- 3- 16::	1	2	3	124	10	10	10	10	34	26	20
3- 3- 17::	1	2	4	103	10	10	10	10	21	16	16
3- 3- 18::	1	1	3	90	10	10	10	10	32	22	18
3- 3- 19::	1	2	5	127	10	10	10	10	40	32	22
3- 3- 20::	1	1	4	103	10	10	10	10	33	23	19
7- 9- 17::	2	2	2	79	10	10	0	0	16	6	10
7- 9- 18::	2	2	1	79	10	10	10	0	18	9	9
7- 9- 19::	2	2	3	115	10	10	10	10	34	32	21
7- 9- 20::	2	1	2	83	10	10	10	10	21	20	19
7- 9- 21::	2	1	2	89	10	10	10	10	24	18	19
7- 9- 22::	2	1	3	103	10	10	10	10	19	20	12
7- 9- 23::	2	1	1	70	0	0	0	0	0	1	0
7- 9- 24::	2	1	1	79	10	10	10	10	16	8	4
7- 9- 25::	2	2	2	77	10	10	10	10	21	8	12
7- 9- 26::	2	2	3	86	10	10	10	10	22	17	8
7- 9- 27::	2	2	2	102	10	10	10	10	35	14	16
7- 9- 28::	2	2	3	83	10	10	10	10	23	20	14
7- 9- 29::	2	1	1	71	10	10	0	0	17	13	13
MEAN ::	1.5	1.5	3.2	99.7	9.8	9.8	9.3	9.1	26.5	16.4	14.8
S.D. ::	0.5	0.5	1.4	13.2	1.3	1.3	2.6	2.9	8.3	6.9	5.7

TOTAL COST FOR THIS WORK IS $ 1240.80

TREATMENT 4. TWO INTACT CLASSES.
J.J. HAS BEEN ALLOCATED FOR THIS WORK

CONCLUDE THE RESULTS AT TIME 12.

TREATMENT 4. TWO INTACT CLASSES.

ID	2 RACE	3 SEX	16 SAES SCORE	33 S-S	75 CRT ADD	76 CRT SUB	77 CRT MULT	78 CRT DIV	42 SAT MATH COMP	43 SAT MATH CONC	44 SAT MATH APPL
3- 4- 1::	1	2	5	113	10	10	10	10	24	24	20
3- 4- 2::	1	1	5	123	10	10	10	10	26	27	25
3- 3- 3::	1	2	5	113	10	10	10	10	24	19	13
3- 3- 4::	1	2	4	123	10	10	10	10	31	22	20
3- 3- 5::	1	2	3	113	10	10	10	10	31	26	25
3- 3- 6::	1	1	5	112	10	10	10	10	31	28	19
3- 3- 7::	1	2	5	119	10	10	10	10	22	16	18
3- 3- 8::	1	1	5	13-	10	10	10	10	35	25	1[illegible]
3- 3- 9::	1	1	4	[illegible]	10	10	10	10	27	23	10
3- 3- 10::	2	1	4	93	10	10	10	10	17	19	9
3- 3- 11::	1	1	5	136	10	10	10	10	40	27	18
3- 3- 12::	1	2	4	120	10	10	10	10	32	27	19
3- 3- 13::	1	2	4	116	10	10	10	10	26	18	13
3- 3- 14::	1	2	5	124	10	10	10	10	32	21	15
3- 3- 15::	1	1	3	83	10	10	10	10	23	12	13
3- 3- 16::	1	2	4	113	10	10	10	10	24	24	23
3- 3- 17::	1	2	4	113	10	10	10	2	14	12	19
3- 3- 18::	1	1	3	94	10	10	10	10	21	22	14
3- 3- 19::	1	2	3	123	10	10	10	10	34	27	19
3- 3- 20::	1	1	4	104	10	10	10	10	33	25	16
7- 3- 17::	2	2	1	70	10	0	0	0	6	2	10
7- 3- 18::	2	2	2	83	10	0	0	0	8	10	7
7- 3- 19::	2	2	3	111	10	10	10	10	29	26	20
7- 3- 20::	2	1	2	93	10	10	10	10	15	14	16
7- 3- 21::	2	1	2	93	10	10	10	10	23	17	16
7- 3- 22::	2	1	3	114	10	10	10	10	19	10	14
7- 3- 23::	2	1	1	70	0	0	0	0	0	1	0
7- 3- 24::	2	1	1	75	10	10	0	0	14	17	10
7- 3- 25::	2	2	2	83	10	10	0	0	17	14	14
7- 3- 26::	2	2	2	91	10	10	10	0	13	15	10
7- 3- 27::	2	2	2	96	10	10	10	10	25	12	14
7- 3- 28::	2	2	4	99	10	10	10	10	9	22	11
7- 3- 29::	2	1	2	75	10	0	0	0	11	13	11
MEAN ::	1.6	1.6	3.2	100.3	9.8	9.0	7.5	5.8	21.0	16.4	13.7
S.D. ::	0.5	0.5	1.4	17.5	1.3	2.9	4.3	4.6	9.3	7.3	5.6

TOTAL COST FOR THIS WORK IS $ 13320.80

Computer Run #5.

The fifth computer run contains only one request. However, that request involves the administration of four different treatments to the same intact class.

Request 7. The use of the same class (same subjects) in three different experimental treatments is not, of course, possible in real life. However, the computer is capable of setting each person back to his pre-test status at the end of each treatment run. This feature provides a convenient method for the Game Manager to discover the "real" nature of the treatment effects. We would not recommend its use in training researchers/evaluators -- although it has some merit as a means of demonstrating the insidious effects of testing error.

Options. One unique option used in this request is the facility for attrition (absence of subjects due to moves, quitting school etc.) over the course of an experiment.

Comments. Note that even though the same class is used, different subjects are absent during different treatments. This happens because the absences are determined randomly within each treatment. (See treatment outputs displayed on the following three pages.)

```
**********
ARDS FOR A SUBMISSION TO THE FEHR DATA GENERATOR. COMPUTER RUN NUMBER 5.
** ENTER THE SYSTEM CARDS TO RUN THE REMAR PROBLEM, FOLLOWED BY THE CARDS BELOW.

 CARD    CONTENTS OF CARD (BEGINNING IN COLUMN 1 )

   1     1011010
   2     30123456789 REQUEST #7. EXPERIMENT USING SAME CLASSES IN ALL TREATMENTS.
   3     01 1 1 00.000000 TREATMENT 1. TWO INTACT CLASSES. MISSING SUBJECTS ON.
   4     0505000 0709000
   5     15 002 003 016 033 075 076 077 078 042 043 044
   6     00 01
   7     MORE
   8     01 1 1 00.000000 TREATMENT 2. TWO INTACT CLASSES. MISSING SUBJECTS ON.
   9     0505000 0709000
  10     15 002 003 016 033 075 076 077 078 042 043 044
  11     00 01
  12     MORE
  13     01 1 1 00.000000 TREATMENT 3. TWO INTACT CLASSES. MISSING SUBJECTS ON.
  14     0505000 0709000
  15     15 002 003 016 033 075 076 077 078 042 043 044
  16     00 01
  17     MORE
  18     01 1 1 00.000000 TREATMENT 4. TWO INTACT CLASSES. MISSING SUBJECTS ON.
  19     0505000 0709000
  20     15 002 003 016 033 075 076 077 078 042 043 044
  21     00 01
  22     END
```

4. Familiarizing Personnel with the Practicum Process

Having familiarized oneself with the operation of the FEHR data generator, the next step is to become familiar with the process of "solving" the REMAR problem. The most effective way of doing this is for the prospective game manager, consultants and associated instructors to complete each task in the practicum as a team, using only the Player's Instructions for guidance. Since the goal is to become familiar with all aspects of the system, we recommend that every task be completed--even those which you do not (presently) plan to use with the player-trainees. The only shortcuts which we would recommend are that only an abbreviated search of the literature be conducted and that all written material be left in rough outline form.

The amount of time required for a complete practice session varies widely with the user's training and experience in research/evaluation, and with the level of service supplied by their local computer--particularly the turnaround time on computer runs. But on the average, assuming that the users are familiar with the local computer facility and the FEHR program, and that at least one team member has had sufficient training and experience to teach research/evaluation methods, the problem-solving activities per se should not take more than five or six hours. However, if computer turnaround time is slow, it will probably be necessary to schedule for three or four 1½ to 2 hour meetings rather than one long meeting.

5. Choosing a Place to Meet

The most important activity during a practicum is the team meetings. The most satisfactory arrangement is a room or rooms with enough tables and (movable) chairs so that each team can have its own table. Preferably, these should be far enough apart to permit comfortable, normal-voice discussions. It is best if there is shelf-space for storage of the Information Banks, IST units, and other local references. Similarly, a room which is near laboratory facilities such as calculators, keypunches, computer terminals, and the like is much to be desired. Convenient access to the computer facilities is, of course, necessary for most usages. (See the examples of FEHR usages for illustrations of suitable facilities.)

There are several occasions during the practicum when it is desirable to have all participants at a single meeting. Because of the group activities involved, it is best if the workroom used for team meetings is large enough

for this purpose as well. However, if such a room is not available, it is quite satisfactory to schedule the large meetings in a regular classroom nearby.

6. Selecting Materials for the Session

There are, of course, several printed materials which are mandatory for any FEHR-PRACTICUM session. The title of each required material, its type (whether it is reusable from session to session or consumable), and the number of copies needed for each session are summarized below:

TITLE	TYPE	NO. COPIES
FEHR Materials Needed		
Player's Introduction to FEHR-PRACTICUM	Reusable	1 per player
Fair City USA	Reusable	1 per player
Player's Instructions for FEHR-PRACTICUM	Partially Consumable	1 per player
RFP Document (for the problem being used)*	Partially Consumable	1 per player
*Note: If the instructions and RFP's have been used previously, check to see whether the following inserts are needed:		
Replacement Forms for Instructions, pp. 2,4,6	Consumable	Included Above
Replacement Checklist of Tasks for RFP, pp. 3-6	Consumable	Included Above
Information Bank (for the problem being used)	Reusable	**
IST Unit I. Assessing Success for Complex Objectives	Reusable	**
IST Unit II. ~~Criterion-Referenced & Mastery Testing~~ Criteria for developing proposals and final reports.	Reusable	**
IST Unit III. Computer Format Statements for FEHR Data	Reusable	**
IST Unit IV. Sampling the Subjects to be Studied	Reusable	**
IST Unit V. Using the FEHR Secretary	Reusable	**
*Note: The number of copies needed varies with the session purpose. From 1 or 2 copies per installation to 1 copy per team. (See examples of FEHR applications for illustrations.)		
Game Manager's Manual for FEHR-PRACTICUM	Reusable	1 per player

In addition to the materials listed above, there are many other materials which may be useful. These must be selected to match the needs and resources of the local area. However, the three following types should be considered.

(1) If the content area of the problem is of substantive interest to the player-trainees, copies of the primary references used in developing the problem may be desirable. Lists of the primary references for each problem appear on pages to of this manual.

(2) If the published tests used in the problem are of substantive interest, it may be desirable to obtain copies of the tests and test manuals.

(3) A certain number of research methods references should be available in almost all practicum settings. Fairly extensive listings of possible references are given in Appendices I and II of the Player's Instructions.

7. Choosing the Practicum Tasks

The first decision in the task selection process concerns the overall structure of the problem to be assigned. That is, should each team complete an entire practicum, only the descriptive phase (tasks 1 to 4 inclusive), or only the comparative phase (tasks 5 to 7 inclusive)? Considering the entry skills of the participants, the resources available (in both material and personnel), the amount of time available for the session activities, and the session's overall instructional goals, which of these three structures should be used?

Next comes a series of decisions related to the specific tasks to be done within the general session structure. The game manager's notes in Section II, Chapter 3 (Player's Instructions) of this manual are intended to guide users in making choices among the various options on the checklist of tasks. However, the set of tasks chosen for a particular session ought to be determined by the specific purposes the session is intended to serve. This relationship is illustrated in the workshop, module, and laboratory examples which follow these guidelines.

8. Planning the Instructional Activities

Throughout this manual we have maintained the position that since FEHR-PRACTICUM is not a self-contained instructional system, it is essential that the practicum be carefully articulated with an appropriate training

program. Depending on the circumstances, an appropriate training might consist of a set of independent study materials, a research/evaluation course built around the practicum activities, a set of highly skilled consultants available on a tutorial basis, or various combinations of these three elements.

It is obvious from the above discussion that the number of possible instructional arrangements are limitless. We can not possibly provide guidelines which would anticipate all possible FEHR-PRACTICUM uses. Instead, we have chosen to describe a few disparate applications in considerable detail. The workshop, module, and laboratory examples provide practical illustrations of how these training arrangements can be adapted to meet specific needs. The details of these examples appear following these guidelines.

Some Philosophical Considerations. It was stated previously that FEHR was designed to be a flexible pedagogical tool adaptable to many instructional purposes. To accomplish this aim, the problems were described in rather global terms, leaving the operational specification of the problem to the users. Thus, if an instructor/Game Manager desired his/her trainees to practice problem definition skills he/she could require the teams themselves to operationalize the problem. If, on the other hand, the instructor/Game Manager wished to concentrate on research design and analysis skills, he/she might provide an operational definition of the problem and ask the teams to work within it. Additional adjustments to the scope of the players' tasks could be made by restricting the number of treatments to be assessed, the number of variables to be considered, and/or the number and type of research subjects to be used.

Despite the conscious emphasis on adapting to an instructor's purposes, it would be a mistake to assume that FEHR is completely non-didactic. Like most instructional products, the FEHR-PRACTICUM system is an implicit operational statement of the instructional philosophy of its authors. There is a pervasive bias which tends to nuture a particular view of the research process and to encourage the use of some instructional practices while discouraging others. We believe that the optimal results can be achieved only if FEHR is used in a manner consistent with its basic structure. Consequently, the remainder of this section is devoted to an explication of the more important beliefs and principles upon which FEHR-PRACTICUM is based.

a. We believe that the empirical evaluation of educational programs is inherently a multidimensional process requiring the interrelation and synthesis of frequently conflicting information from a variety of sources. In our view, a single measure can almost never provide adequate assessment of educational effectiveness per se. In addition, the practical realities dictate that many factors other than a program's effectiveness in meeting an objective be considered. For example, the cost of a program and its degree of support among teachers, parents, and students must be taken into account. To complicate the process still further, there is always a host of irrelevant variables to divert the researcher/evaluator's attention from the important issues. In an attempt to capture some of this multidimensionality, each FEHR problem contains a variety of variables (tests) in each of several domains (attitude, achievement, etc.), and several subgroups of subjects.

b. We are firmly convinced of the validity of the Bush and McConnell (1966) findings that we best learn research skills by doing research. In the area of evaluation and decision-oriented research, we would put the case even more strongly. One can learn to handle ambiguity and complexity only by working with ambiguous problems in a complex environment. Each FEHR problem is designed to provide this kind of experience. The problem definition supplied in the RFP is purposely broad and somewhat ambiguous, and there are always several treatments, many dependent variables (variables which change as a result of a treatment), and many moderator variables (variables which do not themselves change as a result of a treatment, but which change the effect of the treatment on one or more dependent variables).

c. We recognize that for novice trainees it may be pedagogically desirable to begin on a simplified problem. However, we consciously opted not to provide simple problem descriptions providing only two or three treatments and a single dependent variable. However, the Game Manager or the players themselves may delimit the problem to provide an equivalent simplifying effect. It is

our belief that a problem which is consciously delimited in the presence of complexity provides a more valid view of research and develops skills which are more likely to generalize to field research than would result from presenting only the delimited problem without the surrounding details.

d. The above view of the research/evaluation process suggests that there is no universal research method which can be learned in a relatively simple context (e.g., a laboratory), and later applied directly to practical problems in a variety of settings. Rather there are a variety of methods and techniques which must be combined, adapted, and synthesized to meet the idiosyncracies of a given practical problem. Since these combinations and adaptations frequently result in methods which differ in substantive ways from the originals, we call the resultant strategy an idiosyncratic research method.

   The FEHR system provides for training in the development of idiosyncratic research strategies in two ways. First, the eight problems require vastly different research approaches. Second, within each problem it is possible to define the research objectives in several different ways, with each definition requiring a different research approach.

e. The need for idiosyncratic methods demands that programs to train researchers/evaluators emphasize the process by which a research strategy is developed rather than the strategy per se. For this reason the entire FEHR system is designed to create the desire to know and to provide an opportunity to discover.

   One can best illustrate the discovery approach by examining its alternative. It is possible to use FEHR didactically. For example, a particular research strategy could be taught by "solving" a FEHR problem in class, and then asking trainees to practice that solution method using a different sample of subjects (e.g., a different school). While this sort of practice is undoubtedly useful, we do not believe that it takes full advantage of the system's power. Nor does it facilitate learning how to adapt a theoretical method to a practical need.

A less didactic procedure which is more consistent with the training needs would proceed as follows: First, trainees are allowed to struggle with a problem until they develop a need for the method to be taught (but not long enough to become overly frustrated). Second, the research method is taught utilizing an example different from the problem with which trainees are working. Third, trainees adapt the method to their own problem needs. We are convinced that this "discovery" approach will result in a greater depth of understanding and longer retention than more didactic procedures.

f. The discovery approach outlined above requires that a great deal of individualized instruction be available during the practicum. The FEHR consultants are intended to provide this service. In our experience, intensive team-by-team consultation provides far greater increments in learning than a comparable effort expended in large-class session--even though the latter method covers (at least superficially) far more material. To supplement the consultants, some users may wish to make a variety of programmed materials on research methods available to the players. Several examples of suitable materials are listed in the appendices of the Player's Instructions. In any case, we believe it is a serious mistake to use the FEHR system to supplement an existing research/evaluation course without adopting appropriate instructional techniques.

g. The foregoing emphasis on multidimensionality and complexity encourages teams to devise studies involving data sets which are considerably larger than those found in the usual laboratory exercise. The opportunity to develop skills in this area is a feature of FEHR which ought to be exploited whenever possible.

h. Despite FEHR's admitted bias towards large data sets, the sheer size of the research populations, the number of available variables, and the redundancy of information (e.g., some problems have seven or eight intelligence tests) encourages the use of sampling for both subjects and variables. In most settings we would urge the game manager to provide further motivation in this

direction by placing reasonable limits on budgets, number of subjects, and number of variables.

i. The budgeting aspects of FEHR are considered an important and integral part of the practicum. More than any other element, costs motivate the players to plan their activities. Budgeting financial resources generalizes to budgeting of time and (non financial) resources. In fact, it has been our experience that the various costs attached to treatments cause trainees to change their behavior even when they have been told to ignore costs. For example, most trainees refused to use the Stanford-Binet IQ test when they noticed its price ($12.65) even though they were not being charged for it.

In respect to costs, it is important for the game manager to realize that there is an intricate non-linear relationship among test cost, reliability and total experimental cost. The experimental costs can only be compared by holding statistical power constant. To get an intuitive feel for this relationship, assume a matched experimental design in which there is a perfect correlation between the true scores of the matched elements. In this case, all the experimental error is attributable to test unreliability. Thus, given test A with a reliability of .91 for $3 and test B with a reliability of .84 for $2. Using test B the error variance would be $\sqrt{1-r_A}$ or 4/3 times the error using test A. To maintain statistical power equivalent to that obtained with test A, we must use $4^2/3^2$ or 1.77 times as many people in the experiment. Thus using test B we would actually spend $2 X 1.78 = $3.45 for each $3 using test A.

j. Finally, we believe that the team approach provides an added dimension of great value to the FEHR-PRACTICUM experience. The value is of two sorts. First, our experience shows that there is a tremendous amount of intra team teaching and learning during a FEHR project. Second, evaluative research in the practical world tends to be a team project. Consequently, any group-process skills learned during the practicum will have a direct and positive carry-over. We urge instructors/game managers to use teams wherever

possible. Our experience shows that the team size should not be smaller than three nor greater than five. Larger teams tend to break into subunits with one set of trainees doing most of the work. Smaller teams tend to have less verbal interaction and hence less opportunity to learn.

k. Throughout the practicum, every attempt is made to keep the player so busy finding an educational answer that he or she has no time to worry about the necessity of learning the analytic skills necessary to obtain that answer. This is the reason, for example, for requiring that each player complete the orientation questionnaire at the very first meeting. In our experience, this has proven to be the most powerful feature of the model--particularly when FEHR is used with research novices who are fearful of taking a statistics course. In a field evaluation study similar to the module example described later in this section, literally dozens of students told the author that they got so involved with the problem they forgot to be frightened of statistics.

Instructional Options. A number of FEHR's optional features have direct instructional value. These options are of two kinds: those provided by the computer program, and those external to the program. At this stage in planning, the instructor/game manager ought to specify which features will be used during the session. A listing of the features provided and a grief illustration of the instructional purposes each might serve is provided below:

a. Program options. In addition to the design and sampling options available to the teams themselves, a number of options are provided on card 1 of each request which are of great instructional value. Since the functions of the various parameters on card 1 are not described in the Player's Instructions, these options are under the direct control of the game manager. We strongly recommend that each team be provided with punched cards for all system commands and card 1. Whenever the treatment multiplier option is used, the multiplier card should be provided as well. The effect

of each option on the program output is described in the game manager's notes page ___. The instructional function of each is illustrated below.

i. Summary statistics are especially useful for classroom demonstrations in which the patterns of survey or treatment differences are to be illustrated. However, these purposely do not provide sufficient accuracy for precise significance tests. The standard deviations provided are biased estimates calculated using N degrees of freedom rather than N-1.

ii. Punchcard output is of course very useful whenever the output is to be analyzed by a canned computer program. It also has the additional advantage in that card outputs can be used to identify subjects in (subsequent) requests to the data generator. For example, suppose a survey was run and the output punched on cards. These cards could then be used for the random selection of treatment groups, saving the bother of repunching the ID's on cards. However, if this feature is used the subject parameter (card 1 column 5) must be 1.

iii. Budget abort. The budget abort parameter allows the game manager to de-emphasize the importance of costs.

iv. Attrition. The attrition parameter permits the game manager to control the complexity of statistical analysis. For example, zero attrition might be used when analysis of variance was first introduced, but turned on when unequal N designs were studied.

v. Treatment multiplier. The option to change both the absolute and relative sizes of treatment effects is very useful when one wishes to demonstrate concepts of statistical power.

b. Non-program options. Several features of great instructional significance are offered outside the computer program. The most important of these are the message generator, the negotiation of planning grants or porposal "contracts", direct team - computer interactions, and budget administration policies.

i. Message Generator. The term message generator is perhaps a misnomer for the feature as it presently exists in FEHR. Originally we had planned to store a large number of messages which could be randomly selected during play (or pre-selected) so as to simulate the influence of external "Acts of God" such as a hurricane which closes the schools for two weeks, or a teacher's strike with the same result. An example of such a pre-selected series of messages appears in Appendix at the end of this manual. Game Managers are invited to develop adaptations to meet their own local needs.

However, our experience during the field trials was that the most useful messages were those that were sent with a specific didactic purpose in mind. For example, in one REMAR session the players were universally opposed to using "error rpone teacher-made tests", consequently making all selections and decisions on the basis of standardized norm-referenced tests and ignoring the criterion-referenced tests. The following message was sent to each participating team.

To: REMAR Research Teams
From: A. Rummus, Superintendent
Subject: Supplemental report

I have recently received a supplemental report from the committee of math teachers. This statement indicates that pupil-performance on the teacher-made tests they have developed is of major importance. Standardized tests are useful, but the teacher test is a mastery test and gets most specifically at what students should know. We believe that every grade 7 student should be capable of obtaining a perfect score (ID) on all four of these tests. Helping students achieve this goal is the primary objective of any remedial program.

In another case, the staff became concerned that teams were spending too much time in discussions without coming to grips with the specific tasks to be done. The following message was sent.

To: REMAR Research Team
From: A. Lumnus, Superintendent of Schools
Subject: Status Report from Research Team

The Fair City Board of Education will meet this week and, according to their chairman, Mr. Ontop, one of the items on their agenda will be the research proposed to remedy computational deficiencies in the city's seventh graders. He expressed some concern about the amount of time spent on experimentation. Some members of the community are impatient for action. He's quite sure that these persons will be in attendance at the board meeting and would like to be prepared to answer their questions.

For this reason I must ask you to submit a report summarizing exactly what has been accomplished to date. Please direct this report to me through the game manager.

A final example concerns the use of the message generator idea to control a potentially explosive interpersonal problem. In one session a number of black students became concerned that another team was "out to prove the superiority of Fair City whites". The game manager seized this opportunity to send the "life like" memo displayed below. It is suggested that similar memos can be developed by each game manager on-the-spot to handle incipent problems or provide didactic direction.

To: REMAR research teams
From: A. Lumnum Superintendent
Subject: Protecting civil rights

A number of parents have recently complained that many of our programs are sexually biased (e.g., home economics). There also appears to be a good deal of public sympathy for the notion that some of our programs are racially biased. Consequently, the Board passed a resolution stating that no student can be excluded from a program nor compelled to attend a (compulsory) program on the basis of sex or race.

In the interests of good public relations I have directed that in all research projects presently under way the sex and race variables are to be ignored. No comparisons by sex or race are to be made, and there shall be no identification of sex or race in any research reports. Questions involving

identification by sex or race are to be omitted from all future file searches, surveys, or experimental treatments.

ii. Negotiation of funds. Rather than having a fixed maximum budget for planning grants or research proposals, it is possible to accommodate differences in needs and interests by negotiating the budgets with each team individually. This procedure has been very popular with both students and instructors/ game managers. It provides an ideal opportunity for checking design validity, sampling efficiency, logical sequencing of tasks. Some arrangements which have been successful include team negotiation with the game manager (instructor) in a single session, peer review of proposals by one or more (other) research teams prior to a negotiation meeting with the game manager, and the use of the consultants in a session as a formal review panel. In all cases teams have reacted positively to the opportunity to "make their case".

iii. Budget administration. The standard procedure for budget administration requires the game manager to act as a "Bank", and keep track of each teams account. Teams expend moneys by making out a check. Copies of the game manager's record form and a team's FEHR checkbook appear in Appendix at the end of this manual.

If there is a great deal of work for the game manager in a particular session, an alternative to ignoring the budget entirely is to ask teams to provide their own itemized record. An illustration of this approach is provided in the laboratory example (example 3) presented later in this section.

iv. Computer-team interactions. There are two ways in which teams are required to interact with the computer. The first is the submission of a request to the FEHR data generator. In the usual case, a team will need to prepare a maximum of three or four separate runs during an entire session. These could easily be handled without requiring the players to do anything more than punch a few request cards.

The second type of interaction with the computer comes about when a team analyzes the FEHR output with a canned computer program. The number of encounters involved in this process is abviously highly dependent on the local computer system, since no analytic programs are included in the FEHR package. However, it has been our experience that the computer exposure involved in using the data generator -- minimal as it is -- has a positive impact on student's perceptions of the computer, and their willingness to learn how to use it. We strongly recommend that instruction in the use of canned programs at your local computer center be coordinated with the practicum. In this respect, IST unit number III, "Computer Format Statements for FEHR data" should prove useful.

9. Evaluating the Practicum Products

There are five team products described in the checklist of tasks to be accomplished: (1) daily log, (2) request for a planning grant, (3) formal problem description, (4) proposal, (5) final report. (Another product, the orientation questionnaire, might be used as a pre-test or benchmark, but should not be evaluated as a session task.)

These products--especially the last three--provide definitive evidence of what the team has done, and, by inference, what the teams can do. However, the extreme flexibility in the form and content of the products preclude a meaningful discussion of evaluation methods at this point. Rather, we have chosen to provide specific examples of evaluation in sessions with differing purposes. These are included in the descriptions of the workshop, module and laboratory examples which follow these general guidelines. The item is included here to emphasize the need for some product evaluation to be included in every session plan.

10. Evaluating the Effectiveness of the Practicum

The final step in organizing a practicum session is to plan some means for assessing the instructional effectiveness of the total session. These

will hopefully include both the perceptions of those involved and some objective evidence of learning. Again, the flexibility in usage precludes a meaningful description of evaluation methods at this point. This item was included in these guidelines to emphasize the necessity for doing evaluation. However, some specific suggestions for evaluation are included in the examples which follow.

EXAMPLE 1. THE IN-SERVICE WORKSHOP

Mr. X was an administrator for a regional laboratory for educational research and development. He had just received funding for a large new project which required the development of a series of proposals for evaluating program components. He was presently interviewing applicants for approximately twenty new staff positions. Although most of the applicants had a good grasp of the basic principles of research design and statistical analysis, they were all quite weak in what he called the applied skill areas: problem conceptualization, quasi-experimental design, budgeting, determining cost effectiveness criteria, and so on.

1. Defining Session Goals

After reading Sections I and II of this manual, Mr. X decided to hold an intensive two-week FEHR-PRACTICUM session which would be compulsory for all new personnel, and voluntary for present staff (excluding project directors). However, to encourage attendance of the present staff he had let it be known that three new project directors would be chosen largely on the basis of workshop performance. Ten of the present staff voluntarily enrolled, providing a total of 30 player-trainees for the session.

Mr. X specified his end-of-session goals as follows:

(a) Every participant should be able to:

(i) State a problem in terms of relationships among variables.

(ii) Prepare a budget which accurately summarizes the costs of a proposed project in an acceptable form.

(iii) Develop a (quasi-experimental?) design which controls for errors introduced by factors such as the required use of intact groups or differential attrition among treatment groups.

(iv) Develop and defend a criterion of success for determining the degree to which a given objective has been met.

(v) Function smoothly in a team research effort.

(b) In addition to the above, the session should permit selected participants to be judged with respect to their ability to:

(i) Select personnel.

(ii) Plan and organize an efficient team effort to meet a given goal.

(iii) Synthesize the ideas of several group members.

(iv) Respond calmly and effectively to unexpected administration requests to justify a decision or to modify an ongoing project.

2. Choosing Personnel for the Session

Mr. X decided that he would delegate the actual supervision of the session to Mr. Smith, his administrative assistant. Smith was not a particularly strong researcher, but he was a good organizer, a meticulous bookkeeper, and had had extensive experience with the local computer. Accordingly, Smith was appointed Game Manager, with the understanding that Mr. X was to be consulted in all instructional decisions.

The choice of consultants for the session was particularly important, since Mr. X could find no ready-made courses as independent study materials well-suited to his training purposes. However, there were three highly skilled project directors available. These people were appointed as research consultants for the session. To ensure maximum usage, it was decided that consultation would be free and scheduled rather than the paid service described in the FEHR-PRACTICUM descriptions.

3. Familiarizing Personnel with the Data Generator

Since they were using FEHR for the first time, Mr. X, Mr. Smith, and the three consultants ran through each of the familiarization requests just as they appear in the general guidelines.

4. Familiarizing Personnel with the Practicum Process

Mr. X and his staff worked as a team to go through the entire practicum. They completed every task except #7, the consolidation session, which they did not complete since they planned using only the tasks up to and including the proposal (but excluding running the experiment or completing a final report).

5. Choosing the Place to Meet.

Mr. X decided that their regular staff meeting room could be used for

the large-group sessions. The teams could meet in individual offices much as they did in their day-to-day work. Since two key-punches and a small library were available in the office complex, as was a card reader connected to a remote computer shared with the local school district, this arrangement was considered entirely satisfactory.

6. Selecting Materials for the Session

The regular FEHR materials listed on page (3-21) of this manual were ordered, with three copies of all materials marked with a double asterisk. Copies of most of the reference materials listed in appendix I of the Players Instructions were already available in the existing library, along with a few standard statistics references. These were considered adequate for the purposes of the proposed practicum.

7. Choosing the Practicum Tasks

It was observed that the session goals put heavy emphasis on problem definition, operationalizing relationships, budgeting, and designing, but little emphasis on statistical analysis and interpretation. The latter were areas in which most personnel were fairly skilled already. Because of the time constraints, Mr. X decided to assign only tasks 1 to 6.1. The specific assignments appear on the checklist pages to .

8. Planning the Instructional Activities for the Session

At the beginning of the session the Orientation Questionnaire will be expanded to include (on the back of the Questionnaire) a brief narrative description of the player's view of the problem and his/her proposed research strategy. These will be ranked in order of quality by the three research consultants. The players having the top ten questionnaires will then become team leaders. The leaders will be responsible for recruiting two other players to serve as teammates.

The major instructional activity during the session will be scheduled (free) consultation. Throughout the practicum each team will receive two full hours (two one-hour periods) of direct tutorial consultation each day. Consultants are rotated to give each team equal exposure with each. Mr. X will meet with the game manager and the three consultants and for a one-hour brown-bag luncheon each day. At these sessions the progress of each team and of each individual is to be reviewed in detail, and various instructional strategies suggested and discussed. Mr. X will keep annotated records on the progress of each individual. Occasionally he will ask consultants to make specific observations for a few individuals for whom the evidence is inconclusive.

9. Evaluating the Practicum Products

Mr. X and his associate director (Smith) have both evaluated large numbers of proposals for the U.S. Office of Education. They plan to evaluate both the problem definition (task 4.4) and the proposal (task 6.1) using USOE standards. After each evaluation one or the other of them plans to hold a half-hour session with each team discussing the strengths and weakness of the product evaluated.

10. Evaluating the Instructional Effectiveness of the Session

The main evaluation of individual learning will occur through evaluation of the team products and the observational records kept by Mr. X. The new project directors will be chosen on the basis of this information. The aggregate amount of observed change in performance by all players will be one method of evaluating the session as a whole. In addition, each player will be asked to complete a detailed questionnaire rating the value of the session experience. But the most crucial information is the subsequent on-the-job performance of the participants. Mr. X plans to keep detailed records which will allow him to compare the performance of FEHR participants with that of non-participants who were previously on staff. If the evidence is supportive, he plans to have a subsequent FEHR - practicum concentrating on the comparative phase and emphasizing statistical analyses.

EXAMPLE 2. THE RESEARCH TRAINING MODULE

Mr. Y was a professor of educational research who taught a three-course series in research design and data analysis which was a pre-dissertation requirement for most Ph.D. students in Education at his institution. He had noticed that many students who did quite well in his courses were completely unable to formulate an acceptable dissertation proposal or conduct the subsequent analyses and interpretations without extensive individual consultations of a tutorial nature. What was needed, he felt, was more direct instruction in the application of the principles developed in class to a practical problem. At this point Mr. Y went on to steps 2,3, and 4. The detailed goals for the session were actually written after he had become thoroughly familiar with the practicum groups. For reading convenience both broad and detailed goals are listed here.

1. Defining Session Goals

Mr. Y believes he might best train for application by using a FEHR problem as a core experience and reorganizing the content of his previous

CHECKLIST OF TASKS TO BE PERFORMED

Since the work to be accomplished under this RFP varies from location to location, your Game Manager has placed a ( ) before the particular items for which your team is responsible in the PRACTICUM. (If no items are checked, see your Game Manager before proceeding.) A detailed explanation of how to accomplish each task appears in the Instructions section on the page indicated at right. Tasks marked with an asterisk (*) are mandatory in every PRACTICUM. Before beginning, each player should study, interrelate, and synthesize the information contained in the RFP, its various appendices, and the relevant parts of the Fair City Booklet.

Assigned Tasks		Description of Task	Instructions Page
*	(1)	Each player should submit an Orientation Questionnaire to the Game Manager. The specific question to be answered are in the INSTRUCTIONS.	1
*	(2)	Form teams as directed by the Game Manager. The following assignments and requirements apply throughout this PRACTICUM: Team salary: $100 per day. Costs are to be paid as indicated below: ___(a) ignore all costs X (b) pay costs by check ___(c) pay costs with computer receipts Requests for file searches, survey and treatments should be: ___(a) entered by the team via PROMPTS X (b) entered by the team via punch cards ___(c) written on the appropriate form and submitted to the Game Manager A Log of research activities: ___(a) to be kept by each player X (b) to be kept by each team ___(c) no long necessary	1
*	(3)	Operationalize the problem observing the following restrictions: Literature: ___no review necessary ___Information Bank only X Information Bank and regular library Definition: ___Problem definition provided by Game Manager X complete problem definition form	3-5

Assigned Tasks		Description of Task	Instructions Page
X	(4)	Determining Extent and Severity of the Problem	5-7
		X 4.1 Submit a Request for a Planning Grant on the form provided Due Date: End Day 2 Maximum Grant $_____	
		X 4.2 Run File Search and/or Survey Maximum sample size: 3 intact classes Maximum number of variables 10 (— independent; 6 dependent)	
		X 4.3 Analyze the data from 4.2 using appropriate statistical procedures	
		X 4.4 Formal Problem Description (first draft). To be presented for critiquing by the other teams on (date) Day 4	
X	(5)	Funds are available for identifying a Pool of Research Subjects for Treatments __Yes; X No Pool will be selected collectively, punched on cards 1-9	7
X	(6)	Empirical Evaluation of the Education Treatments	
		X 6.1 Submit a Research Proposal to the Game Manager. The proposal must meet these restrictions and requirements: Maximum number of variables per observation: Dependent 6; Independent 4; Total 10 Maximum number of observation times 3 Maximum number of research subjects 160 Date proposal must be submitted Day 9 The maximum project budget is: $ — The proposal should contain each item checked below: X (a) abstract of the proposal X (b) introduction and overview of problem	

Assigned Tasks	Description of Task	Instructions Page

X (c) a review of the related literature from:
- the Information Bank only
- X both the Information Bank and library

X (d) a formal statement of the problem
X (e) a description of the procedures to be used
X (f) a schedule of activities
X (g) an itemized budget

The writing style for the proposal is checked below:

- (a) brief outline
- X (b) detailed outline
- (c) formal narrative

End.

___6.2 Using an appropriate method, divide your sample into treatment groups, observing the restrictions given in Task 3. Run the experiment on the FEHR Data Generator. Data will be output on:

- ___(a) printed copy only
- ___(b) printed copy and punch cards
- ___(c) printed copy and the team's computer file

___6.3 Analyze and interpret the data from Step 6.2 using appropriate statistical procedures. Record restrictions (to be announced by the Game Manager) below:

_____

_____

___6.4 Submit a final report to the Game Manager. The report should contain the proposal items checked in 6.1 plus the items checked below:

- ___(h) the results of the field test
- ___(i) a summary of the statistical findings
- ___(j) a discussion of results culminating in an educational decision
- ___(k) a discussion of the limitations of the project

Assigned Tasks	Description of Task	Instructions Page
	___(l) recommendations for future research ___(m) an appendix containing the log(s) of activities The writing style of the final report should be: ___(a) brief outline ___(b) detailed outline ___(c) formal narrative Final report due date: _____	
_____ (7)	Attend a Consolidation Session (at a time to be announced by the Game Manager) to discuss the strengths and weaknesses of the strategies employed by your team, and any other teams which are attacking the same problem	9

research classes around the practicum tasks. He decided to try out his idea by using the REMAR problem as the core experience for the content previously covered by the first course in the sequence. The old course had covered the basic scientific principles underlying the research process and introduced research dssign and analysis technizues up to an including a simple analysis of variance. Because he was convinced that his proposed shift in emphasis demanded careful analytic thought, Mr. Y spent a good deal of time explicating his purposes. He defined his goals for the session as itemized below:

(a) The primary end-of-session goal is that each student can apply the research ideas taught in class to a practical problem. In operational terms this was stated as follows. Given an example of each FEHR-PRACTICUM task, based on carefully-chosen demonstration variables, each student will, during the course of the session, demonstrate his/her ability to apply the principles and procedures involved by successfully completing the same task using the unique set of variables assigned to him/her. Each product produced in the above process should meet or exceed the standards of research quality commonly used in judging dissertations. In particular, each student should produce a research proposal and final report which together demonstrate the following characteristics:

  (i) Non-ambiguous, operational definitions.

  (ii) A critical assessment of the meaning of studies reported in the literature as opposed to an acritical acceptance of their conclusions.

  (iii) Efficient scheduling of activities.

  (iv) Careful budgeting of time and money.

  (v) Sampling procedures which ensure generalizability.

  (vi) Use of efficient and valid research designs.

  (vii) Descriptions of procedures which are precise enough to permit replication.

  (viii) A systematic assessment of error in making inferences - particularly when there are multiple comparisons or when post-hoc analyses are used.

  (ix) Educational conclusions (decisions) logically derived from the evidence.

  (x) The use of a style and format consistent with accepted scientific standards (e.g., APA Publication Manual).

(b) Although most of the knowledge and skills assessed in the former course are prerequisite to the performance of goal (a) above, it is specifically stated that each student will be able to:

  (i) Identify and describe the steps in the research/evaluation process.

  (ii) Distinguish between external and internal validity.

  (iii) Describe and critically assess the following procedures for controlling common threats to validity: use of a control group, randomization, matching, randomized blocking, repeated

measures (subjects used as their own control).

(iv) Construct alternative hypotheses from a given problem description.

(v) Construct a null hypothesis for a given research (positive) hypothesis and describe its use.

(vi) Classify variables in given experiment as manipulable (treatment), dependent moderator control, or intervening variables, and describe the characteristics of each variable type.

(vii) Construct operational definitions of given variables.

(viii) Construct criterion of success for a given educational objective.

(ix) Construct predicted outcome patterns for experimental comparisons which are consistent with a given hypothesis.

(x) Describe and critically assess the following procedures for controlling threats to validity:

(a) delineation of the research population

(b) method of removal

(c) method of constancy

(d) use of a control group

(e) randomization

(f) matched pairs

(g) matched groups

(h) randomized blocks

(i) using subjects as their own controls

(j) method of counterbalancing

(xi) Distinguish among pre-experimental, quasi-experimental and true experimental designs based on their adequacy for handling threats to validity.

(xii) Construct true experimental designs (up to simple factorial) to meet the needs of a given experimental situation.

(xiii) Describe a given study using the Campbell Stanley notation.

(xiv) Identify, describe, and critically access the utility of each of the following measurement device or concepts:

(a) test reliability (3 types)

(b) test validity (4 types)

(c) scale of measurement (of a set of scores)

(d) grade-equivalent (or age-equivalent) scores

(e) ranks

(f) percentiles

(g) standard scores (several types)

(h) common research scales (e.g., Likert, Semantic differential, rating scales, Thurstone scales)

(xv) Compute, for an appropriate set of supplied data, each of the following quantities using a canned computer program or a calculator (at the student's option):

(a) descriptive statistics including reliability, validity, medium mean, and standard deviation for scores on any one test plus Pearsons rand Spearmans rho to describe relationships between different variables.

(b) score transformations including ranks, percentile ranks, and standard scores.

(xvi) Using canned computer programs, compute and interpret the following significance tests:

(a) correlation coefficient (greater than o?)

(b) two correlation coefficients

(c) t test for a difference in independent means

(d) t test for a difference in paired-score means

(e) chi-square test for independent groups

(f) one-way analysis of variance

2. Choosing Personnel for the Session

Mr. Y was fortunate in that he had a teaching assistant assigned to help him with the laboratory section of his (old) source. The assistant, he decided, could act as game manager (supervisor). In addition, he decided to assign the course assistant the role of research consultant. However, research consultation was to be free and on a scheduled basis rather than a voluntary budget item. Mr. Y himself would assume full responsibility for all instructional functions.

3. Familiarizing Personnel with the Data Generator

Mr. Y had his assistant prepare the cards for each of the five computer runs given in the general guidelines and submit the runs to the computer. At first there were a few problems in getting the program to respond, but with the help of a systems programmer at the computing center this was quickly corrected. Mr. Y and his assistant then went over each request together, comparing their results with those shown in the manual. They has one or two questions about the use of the card 1 options which were not satisfactorily covered in the manual, but these they were able to answer for themselves by running the same request several times using a different card 1 option each time.

4. Familiarizing Personnel with the Practicum Process

Mr. Y and his assistant conferred together to define the REMAR problem and outline the general research strategy. The assistant was then delegated the responsibility for completing the first six tasks on the checklist using a brief outline style for all written materials. He was asked to keep a concise log which they could later use for scheduling assignments. When the six tasks were complete, Mr. Y and his assistant met to determine how they might best use the decision subroutine of the data generator. (This subroutine is not available to player-trainees.) By this time, Mr. Y had decided that, for pedagogical reasons, he was going to restrict all teams to experimental contrasts using standardized tests only - even though he believed that the attainment of perfect scores on all four of the CRT tests (addition, subtraction, multiplication, and division) was the crucial criterion of success. Therefore he decided to use the Decision subroutine to compare each student's decision with the best possible decisions he/she could have made using only standardized ~~this~~ test information. The entire process is described here to provide guidance in using the Decision feature.

The first step in using the Decision subroutine is to define the population to be used in assessing treatments. This target population for the session, they decided, would consist of all REMAR subjects who had a score of zero on one or more of the CRT tests. Since computer time was relatively expensive at their installation, a random sample of 200 of these students was used in the decision routine rather than the entire population.

The second step was to define the set of dependent variables to be used, and the relative importance of each variable. It was decided to use all seven standardized tests of mathematics achievement, with quadruple weight on the one test measuring computations directly and unit weight on the other six tests. The weights for variables 042, 043, 044, 059, 060, 062 and 063 are .4,.1,.1,.1,.1,.1, and .1 respectively.

The third step was to determine for each variable the minimum and maximum cut-off points corresponding to "absolutely no success in meeting this objective" and "complete success in meeting this objective" respectively. Since the CRT tests were accepted as definitions of success/no success, the first step in this process was to find operational (standardized test) definitions of

the point at which all CRT tests equal zero and all CRT tests equal 10. Because the items on each CRT test are considered to be redundant, measures of exactly the same skill, Mr. Y defined the success point on each standardized test as the mean of the scores of those subjects whose total score on the four CRT test is above 30 and less than 40 (i.e., they are right at the point of complete skill but not yet over it). The minimum (no success) point on each test was defined as the mean score of all those who scored zero on all four CRT tests. The resulting minimums (rounded to the nearest whole score) and maximums (rounded up to the nearest whole score) are given in the table below.

Variable Index	042	043	059	060	062	063
Minimum						
Maximum						

The fourth and last step is to enter the information into the computer according to the instructions given on page _____. The card deck for this decision run appears on the opposite page.

5. Choosing a Place to Meet

The classroom used for the old course was quite near the statistics laboratory containing three computer terminals and a number of calculators. A small library/workshop was also available in the laboratory complex. These facilities were considered quite adequate. The scheduled meetings are described later.

6. Selecting Materials for the Session

The regular FEHR materials were to be made available according to the list given on p. (3-27) of this handbook. Five copies of each IST unit and five copies of the REMAR Information Bank were ordered on the basis of one for each five students expected in the laboratory sessions. (Fifty students were expected to enroll, but these were to be split into two laboratory classes of about twenty five each.)

The library in the laboratory containing a good set of statistics references and a good sample of educational research texts. However, it was decided to obtain five sets of the independent-study materials developed by Southwest Regional Laboratory as well. These materials are listed under references in Appendix I of the Player's Instructions (see page _____ of this manual).

7. Choosing the Practicum Tasks

On the basis of the time his assistant took to complete the six practicum tasks, Mr. Y decided that his class could cover all the tasks only if the number of alternatives were sharply reduced. These restrictions appear in the completed Checklist of Tasks on pages to .

8. Planning the Instructional Activities of the Session

The old course had been scheduled for two class-sessions per week each of two hours duration. In addition, each student was expected to spend from two to four hours in the laboratory each week. It was decided that all the students in the new course would meet for a two-hour "lecture" each Monday then split into two groups of about 25 persons each for two separate laboratory sessions, with group 1 meeting on Wednesday and group 2 on Thursday. In the Monday session Mr. Y will present the basic content of the course, with material presented in order of its occurrence in the tasks to be done. Each task will be illustrated using a set of demonstration variables.

On Wednesday and Thursday the students apply the same ideas to their REMAR problem. As indicated previously, each student will have a unique sample of subjects and a unique set of variables to study. Everyone will study two dependent variables (the SAT computation sub-test, and one other test chosen from the six standarized tests in mathematics), and one independent (control) variable, under three treatment different treatment conditions. The elements to be studied will be combined so as to form unique experiments for each student.

Throughout the laboratory periods students will be encouraged to work in three-member teams to discuss process, but to complete each task on their own. Thus, there will be approximately six "teams" in each lab session. Mr. Y plans to spend 15 minutes in consultation with each team each lab period. The game manager (teaching assistant) will be on call during each lab period and available for additional individual help by appointment for an additional four hours each week.

Mr. Y feels that although he is adding two additional contact hours each week, he will actually spend no more time on the total course than usual.

CHECKLIST OF TASKS TO BE PERFORMED

Since the work to be accomplished under this RFP varies from location to location, your Game Manager has placed a ( ) before the particular items for which your team is responsible in the PRACTICUM. (If no items are checked, see your Game Manager before proceeding.) A detailed explanation of how to accomplish each task appears in the Instructions section on the page indicated at right. Tasks marked with an asterisk (*) are mandatory in every PRACTICUM. Before beginning, each player should study, interrelate, and synthesize the information contained in the RFP, its various appendices, and the relevant parts of the Fair City Booklet.

Assigned Tasks		Description of Task	Instructions Page
*	(1)	Each player should submit an Orientation Questionnaire to the Game Manager. The specific question to be answered are in the INSTRUCTIONS.	1
*	(2)	Form teams as directed by the Game Manager. The following assignments and requirements apply throughout this PRACTICUM: Team salary: $100 per day. Costs are to be paid as indicated below: ___(a) ignore all costs X (b) pay costs by check ___(c) pay costs with computer receipts Requests for file searches, survey and treatments should be: ___(a) entered by the team via PROMPTS X (b) entered by the team via punch cards ___(c) written on the appropriate form and submitted to the Game Manager A Log of research activities: X (a) to be kept by each player ___(b) to be kept by each team ___(c) no long necessary	1
*	(3)	Operationalize the problem observing the following restrictions: Literature: ___no review necessary X Information Bank ~~only~~ and one ___Information Bank and regular library Definition: ___Problem definition provided by Game Manager X complete problem definition form	3-5

Assigned Tasks		Description of Task	Instructions Page
X	(4)	Determining Extent and Severity of the Problem	5-7
	X 4.1	Submit a Request for a Planning Grant on the form provided Due Date: Approximately Sept. 24 Maximum Grant $ to be negotiated	
	X 4.2	Run File Search and/or Survey Maximum sample size: 3 intact classes Maximum number of variables 5 (3 independent; 5 dependent) Assigned	
	X 4.3	Analyze the data from 4.2 using appropriate statistical procedures	
	X 4.4	Formal Problem Description (first draft). To be presented for critiquing by the other teams on (date) Approximately Oct 15; Consensus definition to be developed at the meeting	
X	(5)	Funds are available for identifying a Pool of Research Subjects for Treatments ___Yes; X No Pool will be supplied	7
X	(6)	Empirical Evaluation of the Education Treatments	7-9
	X 6.1	Submit a Research Proposal to the Game Manager. The proposal must meet these restrictions and requirements: Maximum number of variables per observation: Dependent 2 ; Independent 1 ; Total 3 Maximum number of observation times 1 Maximum number of research subjects 120 Date proposal must be submitted Nov 1 approximately The maximum project budget is: $ Negotiable The proposal should contain each item checked below: ___(a) abstract of the proposal X (b) introduction and overview of problem	

Assigned Tasks	Description of Task	Instructions Page

X (c) a review of the related literature from:
___ the Information Bank only
X both the Information Bank and ~~library~~ one library study

X (d) a formal statement of the problem
X (e) a description of the procedures to be used
X (f) a schedule of activities
X (g) an itemized budget

The writing style for the proposal is checked below:

___ (a) brief outline
X (b) detailed outline
___ (c) formal narrative

X 6.2 Using an appropriate method, divide your sample into treatment groups, observing the restrictions given in Task 3. Run the experiment on the FEHR Data Generator. Data will be output on:

___ (a) printed copy only
___ (b) printed copy and punch cards
X (c) printed copy and the team's computer file

X 6.3 Analyze and interpret the data from Step 6.2 using appropriate statistical procedures. Record restrictions (to be announced by the Game Manager) below:

Use canned programs only.

X 6.4 Submit a final report to the Game Manager. The report should contain the proposal items checked in 6.1 plus the items checked below:

X (h) the results of the field test
X (i) a summary of the statistical findings
X (j) a discussion of results culminating in an educational decision
___ (k) a discussion of the limitations of the project

Assigned Tasks	Description of Task	Instructions Page

___(l) recommendations for future research
X (m) an appendix containing the log(s) of activities

The writing style of the final report should be:

___(a) brief outline
X (b) detailed outline
___(c) formal narrative

Final report due date: Approximately Dec. 1

_____ (7) Attend a Consolidation Session (at a time to be announced by the Game Manager) to discuss the strengths and weaknesses of the strategies employed by your team, and any other teams which are attacking the same problem 9

Approximately Dec. 7

In the old course he spent several hours each week checking on the mathematical accuracy of students' statistical problems. The new emphasis permits him to check only the accuracy of the entry into the computer - he believes that he and his assistant can do most of this during the lab sessions. The additional emphasis on problem definition, measurement, design, and general research methods which are to be substituted for the calculator computations in the old course will be checked and reinforced during the consultation sessions, as well. The instructional power of of the whole system depends on regular feedback.

9. Evaluating the Practicum Products

The two main products (the proposal and the final report) will be subjected to both peer review and instructor review. Peer review will be done on an assigned round robin basis using a checklist supplied by the instructor. The instructor will then rate both the product and the checklist for accuracy and completeness. Any incomplete or inaccurate elements must, of course, be corrected. Before the end of the course each student must have products, which are acceptable in all respects.

10. Evaluating the Instructional Effectiveness of the Practicum

The immediate instructional effectiveness of the practicum will be assessed in four ways. First, a brief achievement test will be given every three weeks. The applied statistics items from these tests will be taken directly from statistics tests of previous years. Performance on these items can be compared with previous years.

Second, both the instructor and the teaching assistant will keep a checklist of skills. Each student will be observed regularly during the lab; whenever he is observed demonstrating one of the listed skills (e.g., running a particular planned program successfully), the skill will be checked off on the list.

Third, the products of the sessions are considered to be direct evidence of students' ability to apply research ideas. In addition to the marking procedure explained above, other faculty members will be invited to examine these products and comment upon their adequacy.

Fourth, a questionnaire will be administered at the end of the session. It will include a series of items asking students to assess their learning during the session.

EXAMPLE 3. APPLIED STATISTICS LABORATORY

Ms. Z was also a professor of educational research, but she taught only one senior course featuring the analysis of variance and covariance. Students had frequently complained that the course was both too theoretical and too difficult and that the examples used (in the textbook) were irrelevant to education. Like Mr. X, she too had noticed that students had difficulty applying classroom concepts to practical problems.

1. Defining the Session Goals

Ms. Z decided to use the comparative phase of the REMAR problem (tasks 6 and 7) to provide practice in the application of the ideas presented in class. It was her hope that a problem-solving approach to the data would also spark student curiosity thus making the entire course more meaningful and perhaps even less difficult. Procedurally, she began with a rough statement of goals which were refined and elaborated after she completed steps (2) and (3) which follow. For the reader's convenience these goals are stated here in their final form. The session goals were:

a. Given a specific target population and a set of research hypotheses which relate changes in a dependent variable to various combinations of treatment, modifier, and control variables, each student will be able to design a study which provides a valid test of (the null form of) each hypothesis, collect experimental data from the FEHR data generator, analyze the data using an appropriate statistical technique, interpret the educational implications of the results, and, on the basis of that interpretation, recommend the treatments to be used with various members of the target population.

b. Student will achieve as well or better than students from previous class on the written examinations used last term.

c. Student complaints of irrelevant, overtheoretical, and overdifficult content will be reduced.

2. Choosing Personnel for the Session

Unlike the instructors in the two previous examples, Ms. Z did not have access to either a course assistant or laboratory supervisors. After a careful examination of all the supervisory tasks entailed, she decided that she could perform all three functions - instructional, game manager, and consultant - herself. In fact, except for the bookkeeping involved in recording grants and check payments, the administration of a FEHR - PRACTICUM appeared very similar to the supervision of the regular laboratory

problems she had used previously.

3. Familiarizing Personnel with the Data Generator

Ms. Z completed each sample run provided in the general guidelines, and then re-ran several examples trying various combinations of the Card 1 parameters.

4. Familiarizing Personnel with the Practicum Process

Ms. Z completed an entire practicum herself, following the Player's Instructions assiduously. After running through the practicum, she devised a series of increasingly complex factorial experiments always using treatment as one of the factors and various moderator variables (e.g., sex, socio-economic status, IQ, initial math ability, etc.) as additional factors. She also experimented with a variety of sampling procedures to eliminate, equate, or balance out the effects of variables she arbitrarily designated as control variables (e.g., sex, race, fathers education, etc.). At the end of this procedure, she was confident that FEHR-PRACTICUM would serve her purposes. At this point she returned to the session goals (step 2) and revised them to their present form.

5. Choosing a Place to Meet

The classroom in which Ms. Z's regular class had been held was suitable for both large-group meetings and for team work sessions.

6. Selecting Materials for the Session

The regular FEHR materials listed on page of this manual were ordered, with three copies of all materials marked with a double asterisk. Copies of the suggested references and many of the auxiliary references were available at the University Library.

7. Choosing the Practicum Tasks

It was obvious from the list of goals that a complete FEHR-PRACTICUM was unnecessary. Ms. Z decided that she would supply an operational definition of the problem, a listing of the target population of computationally disadvantaged students and complete summary statistics (means and standard deviations for various subgroups of the population (e.g., grouped by sex, grouped by socio-economic status, and the like). In addition, each team was to be

supplied with a punchcard copy of the survey data on each member of the target population. These cards could then be physically sorted into various treatment groups and used to run the experiment in the data generator. (When this is done, card 1 of each computer run must contain a 1 in column 5.) Thus the same subjects (cards) can be sampled in various ways to test sets of hypotheses implying different research designs. Two examples will suffice:

a. Hypothesis. When the treatment groups are of equal intelligence, the AUTOMATH program will produce larger scores on the SAT computation subtest than the regular class.

   Implied design. A one way randomized block (or possibly matched groups) design is implied, with groups blocked by intelligence.

b. Hypothesis. Other things being equal, subjects will, on the average, gain more on the SAT computation test with the AUROMATH programs than in the regular class. However, this difference will be much more pronounced for subjects of low intelligence than for those of average or high intelligence.

   Implied Design. A three-way factorial randomized groups design is simplified (treatment by intelligence by time), with repeated measures (pre and post) on the time factor. Randomization is the only method of equating groups on all "other things".

The complete listing of assigned practicum tasks appear on pages to . The general assignments given to the teams reflect the fact that only Ms. Z will be available to players. Thus, students are required to budget their requests and to keep track of their expenditures, but they do not have to pay for requests with checks. (Nor does Ms. Z have to keep track of them.)

8. Planning the Instructional Activities for the Session

As in example 2, each student (player) will be expected to finish a series of experiments defined by hypotheses supplied by Ms. Z. The hypotheses will be designed to lead students through progressively more complex designs. In each case the theory will be supplied in a class lecture before the assignment is given.

Although individual proposals and reports will be assigned, students will be encouraged to work in groups to develop processes. The individualized nature of their assigned subjects and variables permits close consultation on process

CHECKLIST OF TASKS TO BE PERFORMED

Since the work to be accomplished under this RFP varies from location to location, your Game Manager has placed a ( ) before the particular items for which your team is responsible in the PRACTICUM. (If no items are checked, see your Game Manager before proceeding.) A detailed explanation of how to accomplish each task appears in the Instructions section on the page indicated at right. Tasks marked with an asterisk (*) are mandatory in every PRACTICUM. Before beginning, each player should study, interrelate, and synthesize the information contained in the RFP, its various appendices, and the relevant parts of the Fair City Booklet.

Assigned Tasks		Description of Task	Instructions Page
____*	(1)	Each player should submit an Orientation Questionnaire to the Game Manager. The specific question to be answered are in the INSTRUCTIONS.	1
____*	(2)	Form teams as directed by the Game Manager. The following assignments and requirements apply throughout this PRACTICUM: Team salary: $____ per day. Costs are to be paid as indicated below: ___(a) ignore all costs ___(b) pay costs by check ___(c) pay costs with computer receipts Requests for file searches, survey and treatments should be: ___(a) entered by the team via PROMPTS ___(b) entered by the team via punch cards ___(c) written on the appropriate form and submitted to the Game Manager A Log of research activities: ___(a) to be kept by each player ___(b) to be kept by each team ___(c) no long necessary	1
____*	(3)	Operationalize the problem observing the following restrictions: Literature: ___no review necessary ___Information Bank only ___Information Bank and regular library Definition: ___Problem definition provided by Game Manager ___complete problem definition form	3-5

Assigned Tasks	Description of Task	Instructions Page
_____ (4)	Determining Extent and Severity of the Problem	5-7
	___4.1 Submit a Request for a Planning Grant on the form provided Due Date:_____ Maximum Grant $_____	
	___4.2 Run File Search and/or Survey Maximum sample size:_____ Maximum number of variables____ (___independent; ___dependent)	
	___4.3 Analyze the data from 4.2 using appropriate statistical procedures	
	___4.4 Formal Problem Description (first draft). To be presented for critiquing by the other teams on (date)_____	
_____ (5)	Funds are available for identifying a Pool of Research Subjects for Treatments ___Yes; ___No	7
_____ (6)	Empirical Evaluation of the Education Treatments	7-9
	___6.1 Submit a Research Proposal to the Game Manager. The proposal must meet these restrictions and requirements: Maximum number of variables per observation: Dependent_____; Independent_____; Total_____ Maximum number of observation times_____ Maximum number of research subjects _____ Date proposal must be submitted_____ The maximum project budget is: $_____ The proposal should contain each item checked below: ___(a) abstract of the proposal ___(b) introduction and overview of problem	

Assigned Tasks	Description of Task	Instructions Page

___(c) a review of the related literature from:
___the Information Bank only
___both the Information Bank and library
___(d) a formal statement of the problem
___(e) a description of the procedures to be used
___(f) a schedule of activities
___(g) an itemized budget

The writing style for the proposal is checked below:

___(a) brief outline
___(b) detailed outline
___(c) formal narrative

___6.2 Using an appropriate method, divide your sample into treatment groups, observing the restrictions given in Task 3. Run the experiment on the FEHR Data Generator. Data will be output on:

___(a) printed copy only
___(b) printed copy and punch cards
___(c) printed copy and the team's computer file

___6.3 Analyze and interpret the data from Step 6.2 using appropriate statistical procedures. Record restrictions (to be announced by the Game Manager) below:

_____

_____

___6.4 Submit a final report to the Game Manager. The report should contain the proposal items checked in 6.1 plus the items checked below:

___(h) the results of the field test
___(i) a summary of the statistical findings
___(j) a discussion of results culminating in an educational decision
___(k) a discussion of the limitations of the project

Assigned Tasks	Description of Task	Instructions Page
	___(l) recommendations for future research ___(m) an appendix containing the log(s) of activities The writing style of the final report should be: ___(a) brief outline ___(b) detailed outline ___(c) formal narrative Final report due date:_____	
_____ (7)	Attend a Consolidation Session (at a time to be announced by the Game Manager) to discuss the strengths and weaknesses of the strategies employed by your team, and any other teams which are attacking the same problem	9

while still requiring an individual application. The sets of variables to be used correspond closely to those described in experiment 2.

9. Evaluating the Practicum Products

Each of the practicum products will be marked by Ms. Z as a regular laboratory assignment. It is planned to base a fairly large portion of the course grade (e.g., 75%?) on these products. Brief proposals and reports are expected for hypotheses defining each of the following designs.

a. one way randomized groups
b. one way randomized blocks
c. three way factorial
d. factorial with repeated measures
e. simple latin square
f. one way analysis of covariance
g. factorial analysis of covariance

10. Evaluating the Instructional Effectiveness of the Practicum

Ms. Z plans to evaluate the effectiveness of the practicum in three ways:

a. Tests used in previous years will be administered to practicum students and their scores compared with those of previous classes.
b. Students at the end of the course will be asked to fill out a questionnaire which invites critical assessment of the practicum projects.
c. A record will be kept to compare the kinds of help required by students doing dissertations this year (no FEHR) and next (FEHR experience).